SEPTEMBER 1958 / 50c

AIR FORCE

• The Magazine of AMERICAN AIRPOWER / Published by the Air Force Association

The Mix-up in Air Defense

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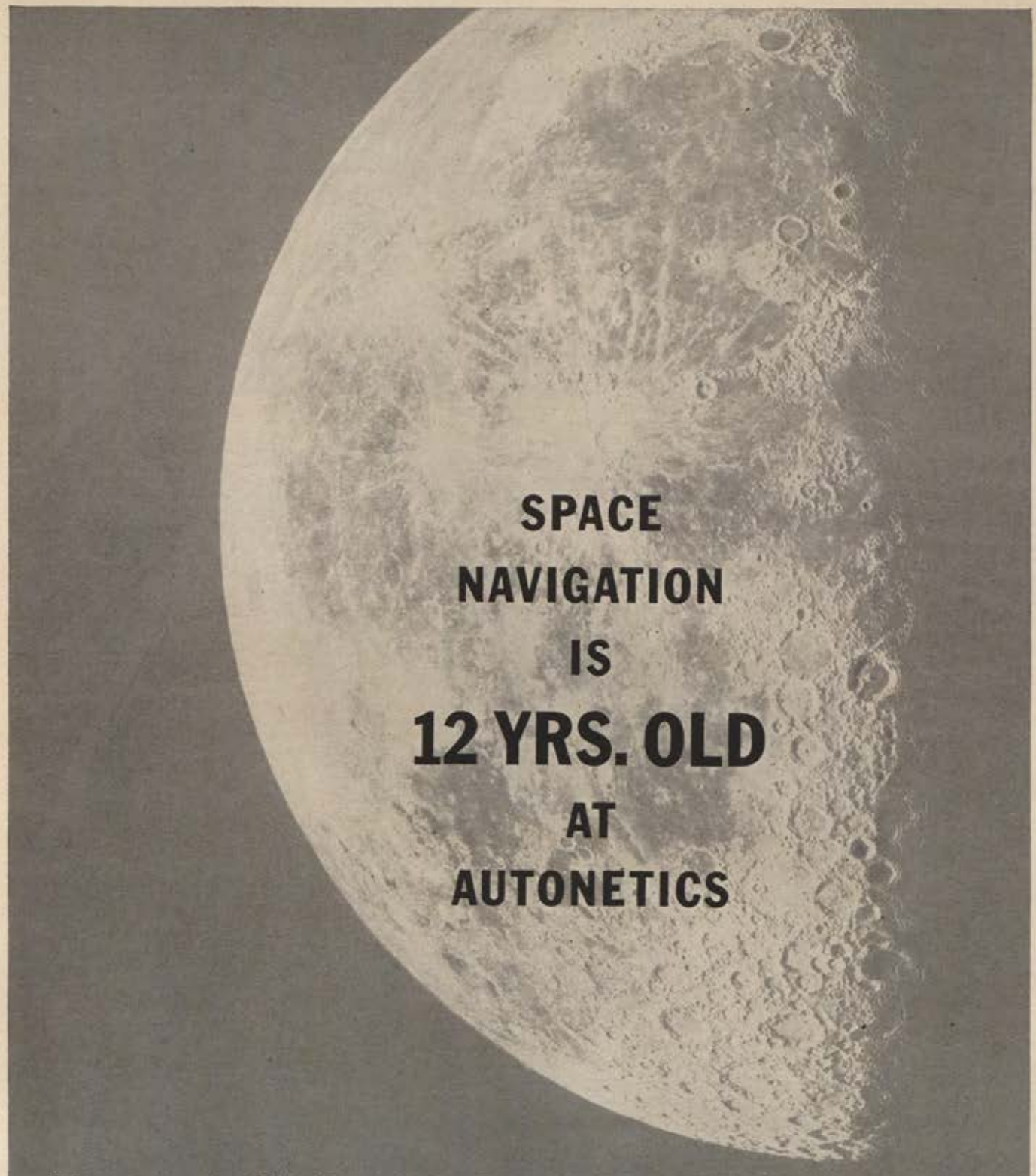

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AIR FORCE

THE MAGAZINE OF AMERICAN AIRPOWER

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FEATURES

DEPARTMENTS

U.S. ARMY'S TATSA PUTS THE IROQUOIS TO THE TEST!

During the next few months the Army's Iroquois helicopter — the Bell HU-1A — will be put through a series of stringent, exacting tests. A 6 to 8-place, turbine-powered utility helicopter, the Iroquois was built expressly for front line duty with the Army.

One of the obstacle courses the Iroquois must run is the U. S. Army Transportation Aircraft Test and Support Activity 1000 hour logistical evaluation test. TATSA has developed an accelerated 1000 hour test program that must be completed in no longer than six months. The Iroquois will be flown a minimum of 10 hours each day — maintenance and upkeep must be done at night. Simultaneously other testing agencies will expose the Iroquois to every possible operating condition that may be encountered later by using units in the field.

One of the chief benefits from this testing is the tremendous savings to the government in providing the services with a tried and tested aircraft, fully capable of meeting all requirements for which it was procured. The Iroquois has already passed Bell's own exacting tests — proved its worth as a warrior. Completion of Army testing will insure that the U. S. Army has in the Iroquois today's *best* and *most advanced* helicopter.

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An Editorial

The Little World of General Gavin

John F. Loosbrock, Editor

THE book *War and Peace in the Space Age*, by Lt. Gen. James M. Gavin, USA, Ret. (Harper & Brothers, New York, $5), might well have been sub-titled "The Little World of General Gavin." In this book, which made quite a splash at publication time, including a two-part condensation in *Life* magazine, the former boss of Army research and development takes a searching look at the nation's defenses—past, present, and future.

When General Gavin talks about what has been wrong with our military establishment in an over-all sense he is hard to quarrel with. He cites bureaucratic indecision, particularly in the field of research and development, shortages of funds, the refusal to admit the extent and implications of Russian technological progress, as evils of the past decade. But he is understandably parochial in his interpretation of how these evils have affected our military posture. He is worried about what these shortcomings have done to the Army. It all depends on where you sit, for the same problems have beset the Air Force over the same period of time, and, I am sure, the Navy as well.

General Gavin is quite upset over the steady decline of his service as a military instrument. Apparently he blames the Air Force a good deal for this, as well as a national strategy keyed to airpower instead of ground power. His solution in the book, as well as during his stint in the Pentagon, is to plug steadily for more and more Army intrusion into Air Force fields of competence, particularly in the fields of missiles and aerial transport.

Perhaps a clue to General Gavin's bitterness toward the Air Force and airmen in general can be found early in the book. On his graduation from West Point he had aspirations to be a flyer, of which he writes:

"My first assignment was to the flying school at Brooks Field, Texas. That was the first and worst letdown of my career as a soldier; I am not sure what they were doing at Brooks Field in 1929, nor am I sure that the authorities there were. The object seemed to be to keep graduated [West Point] cadets from learning how to fly."

In General Gavin's subsequent brilliant career as a paratroop general, in his almost obsessive preoccupation with airborne mobility for ground forces, in his insistence that there should be no ceiling on Army interest in the missile business, in his obvious dislike of the Air Force and most Air Force people, one can detect bitter overtones of a man who, frustrated in his own desire to fly, has spent a good deal of time in proving that "Anything they can do, I can do better."

There are a couple of points in the book which an ex-infantryman like myself cannot let go unchallenged. One is General Gavin's denunciation of weapon research and development in the Army. He points out that American troops went into Korea armed with the same 2.36-inch bazooka whose rockets had bounced harmlessly off German Tiger tanks during World War II. "In land warfare," he writes in connection with World War II, "our tanks, in terms of armor, gunpower, and range, were outperformed from the beginning to the end of the war. Our antitank weapons and our heavy machine guns were inferior quantitatively and qualitatively." A lot of us with infantry combat experience can underscore all this—and add a few horror stories of our own. In Korea our ground weapons were not appreciably better.

What is unsaid, of course, is that ground force weapons have been, by and large, the products of the Army's antiquated, inbred arsenal system which has thus far been almost one hundred percent successful in seeing to it that the Army begins to fight one war with the weapons left over from the previous one.

If the alliance between the Air Force and the aviation industry had produced the same kind of results, there would have been no B-29 to usher in the atomic age over Hiroshima, no F-86 to keep the MIGs off our foot soldiers' backs in Korea. The Springfield rifle with which the Army began World War II was developed in 1903. Suppose we had gone against the Luftwaffe with Wright Flyers!

It is also interesting to note that little has been done, even under General Gavin's aegis as head of Army research and development, to rectify this situation. In an Army preoccupied with thoughts of its own long-range airlift, a battlefield sky awhirl with helicopter "sky cavalry," and Army-developed and Army-operated missiles for every range and mission, the doughfoot bids fair to wind up as the forgotten man insofar as his personal fighting equipment is concerned. General Gavin's arguments for more ground force airlift would be much more cogent had the thirteen years since World War II been devoted to development of ground weapons that could be reasonably easily toted by air.

In the beginning of his book, General Gavin, who fancies himself a military "liberal" because he believes limited war is not only more likely but more important than general war, has this to say:

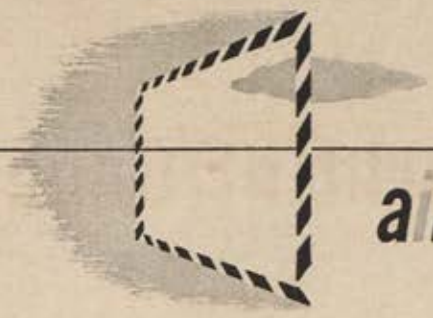
"A much-discussed topic today is limited war, and much of it, I fear, is wishful thinking. *For a limited-war concept is only valid within an impressive over-all framework to wage general war.*" (Italics supplied.)

Yet having thus briefly genuflected toward general war, the remainder of the book suggests that we should neglect, or at least reduce, our capability to wage general war in order to meet a multitude of secondary requirements.

One can only conclude that General Gavin is searching for a major role for the Army in national defense, although when he gets to space, which cannot be rationalized into the Army mission, he suggests a unified command, "with all services participating, reporting directly to the Secretary of Defense."

In sum, General Gavin thinks the defense establishment would be in pretty good shape if the Army were allowed to dominate it. As an expression of a point of view having great currency in today's Army, General Gavin's book is interesting and vigorous in expression.

But when it comes to the question of how best to expend our national defense effort, he is looking through the wrong end of the telescope.—END



air mail

Comments on Anniversary Issue

Gentlemen: Like people who don't write letters to the editor, I am one who, lamentably, fails to become vocal when I see something exceptional.

That's the word for your anniversary issue, which I received this morning.

For reference alone, I know it will be invaluable in every newspaper office. Like many another newspaper, I know we have located many a fine Texas air base in New England.

Congratulations to your staff, who really did a fine job to make things easier for us.

Charles J. Yarbrough
The Evening Star
Washington, D.C.

Gentlemen: I read each new AIR FORCE issue with great interest. These days it's about all that keeps me posted on what the service is doing. From where I sit the quality seems to rise steadily, and I've been pleased to see a growing tendency to quote you in editorial sections of such papers as the New York *Herald Tribune*.

Lt. Col. Kenneth E. Kay
APO, New York, N.Y.

Gentlemen: I couldn't agree more with your editorial "Force in Being" in the August '58 issue.

At present, it appears that our missile system has a "lotta little left jabs." Now it's time to develop a "strong right."

A/1C A. Satouni
Milwaukee, Wis.

Gentlemen: Congratulations for a job well done on AIR FORCE Magazine's Anniversary Issue.

At present I'm a Service Member, and I've realized what AFA has done and will do for airpower. The Air Force is very close to my heart, and when I retire I plan to carry on by supporting AFA's objectives.

M/Sgt. Henry J. Lacour
Hamilton AFB, Calif.

Too Many Bunker Hills

Gentlemen: Your August issue is one of the best. I have just finished reading it and it's great.

There is one small mistake on your Map of Air Force Bases on page 73. You put Bunker Hill Air Force Base at the bottom of Indiana. It is up by Peru in the center of the state.

Philip Hunsberger
Kokomo, Ind.

● *You are quite right. Seems there are two towns called Bunker Hill in Indiana—one (population 629) nine miles south of Peru, which is in the north central part of the state, and the other (population 500) in southwest Indiana. We made the mistake of picking the small one.*—THE EDITORS

Unclassified Information Only

Gentlemen: Your Anniversary Issue has just reached me and I read through it with a mixture of amazement and some despair.

Perhaps I'm a bit mixed up as to present-day values and just what is considered important and strategic and "top secret." However, in my youth I did some boxing and one of the principal rules I recall was never to "telegraph your punches."

In your Anniversary Issue (in great detail) you tell the world the complete story of our Air Force, with lists and pictures and present addresses of our Command and Staff—a full story of our weapons from fighters to experimental craft, and, indeed, a scale map of our "Major Active Air Force Bases in the Continental United States."

Really, I don't know what type of thinking guides our nation these days which provides such information for publication in your magazine for dissemination to our potential enemies. The Russians can disband their espionage force and buy a dozen copies of AIR FORCE, which will give them all and more than all they could ever gain by employing a thousand spies.

As a former pilot in the AEF, and a present father of two sons, who are B-47 pilots in Strategic Air Command, can you tell me what is behind all this?

John E. Tynan
New York, N. Y.

● *To the best of our knowledge and belief,* AIR FORCE *has never breached security. The material in our Anniversary Issue was compiled entirely from unclassified sources. We doubt that anything in it was unknown to the Soviets or that it would make any great difference in their war plans had there been.*—THE EDITORS

Not So Smart

Gentlemen: Your August issue is, as usual, a fine job. But on page 47, on the Photochart, you list Maj. Gen. Jacob E. Smart as "Assistant Chief of Staff." I believe his proper title is "Assistant *Vice* Chief of Staff."

Max Tanner
Dorchester, Mass.

● *It sure is.*—THE EDITORS

Score One More for Mike

Gentlemen: I was quite pleased to see "The Bolt Catchers" featured in your fine magazine in June. We at Otis felt we had a story to tell about lightning strikes on our aircraft, and Mike Gladych was the man who could tell it. Mike, because of his wide experience in flying matters, fully understands our mission.

I understand that he has an article pending on our Texas tower helicopter operations. I should like to recommend this unusual story to you.

Col. R. W. DaVania, Commander
Hq, 551st AEW&C Wing
Otis AFB, Mass.

● *Thanks for the kind words about "Bolt Catchers." Mike's piece on the Texas tower helicopter operations appears on page 62 of this issue.*—THE EDITORS

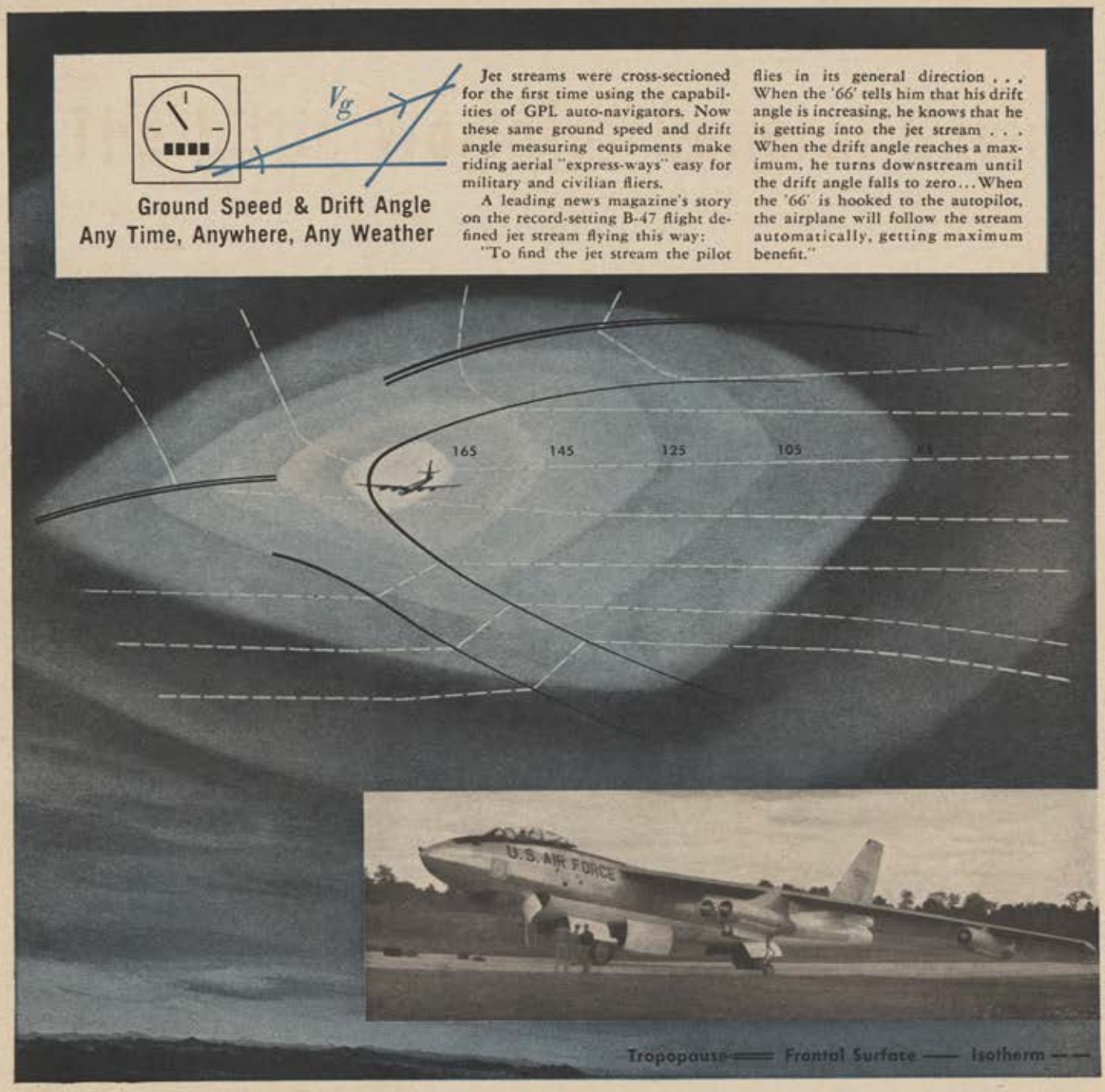
Course for ISOs

Gentlemen: At Boston University we have eight Air Force officers as regularly enrolled officer-students in our graduate program in public relations, and each June conduct a special course for ISOs. Therefore, we have more than usual interest in what's going on in the Air Force.

One of our students has recommended the August issue of AIR FORCE Magazine as a valuable compendium.

Prof. Howard Stephenson
Boston, Mass.

(Continued on page 11)



Cross-section of a headline

Headlines were made the day a GPL auto-navigator guided a USAF B-47 into the jet stream over California, set her down only 3 hours and 47 minutes later in sight of the Atlantic!

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RADAN* Navigation Systems, recently released for civilian use, are now available to everyone. They save precious time and fuel for the air lines, provide a priceless margin of safety for all.

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Nine, Not Six

Gentlemen: In perusing your "Fifty Years of Airpower" chronology in the August Anniversary Issue (pg. 197), I find an error which I bring to your attention, only to set the record straight.

On July 1, 1939, nine Army contract pilot schools began training, rather than six. My school at Park Airport in East St. Louis, Ill., had forty students in the first class, one of whom was James F. Dow, immortalized by Dow Air Force Base, Me. I believe that the other eight contract schools had a comparable number of students.

The nine schools, together with the Senior Air Corps Supervisor at each, were as follows:

San Diego, Calif., (Ryan); Capt. John C. Horton

Los Angeles, Calif., (Glendale); Capt. Edwin M. Day

Marietta, Calif.; Edward H. Alexander

Dallas, Tex., (Love Field); Capt. Emmett F. Yost

Tulsa, Okla., (Sparton); Capt. Charles A. Harrington

East St. Louis, Ill., (Parks Airport); 1st Lt. Robert B. Davenport

Chicago, Ill., (Glenview NAS); 1st Lt. H. Paul Dellinger

Lincoln, Neb., 1st Lt. Roy T. Wright

Tuscaloosa, Ala.; 1st Lt. James W. Gurr

I find in the 1958 Air Force Register that all of the officers listed are on active duty or retired, except Charlie Harrington, whom I am unable to locate. This proves that a solid background in Primary Flying instruction is conducive to long life, or that the Training Command wouldn't allow its experienced instructors to go to war.

Col. Robert B. Davenport
2650th Air Reserve Center
Chicago, Ill.

Keeping a Level Head

Gentlemen: Thank you for the editorial which appeared in the July issue of AIR FORCE Magazine.

In these days of confused thinking about the importance of the conquest of outer space, it is indeed true that many who ought to know better are seemingly forgetting the vital defense requirements of today.

It is comforting to read an editorial such as this which seeks to get us back on the track. Keep hammering away, for sane thinking must prevail. We cannot go all out for future trips to the moon, at the same time forgetting the very vital defense needs of right now.

My very sincere congratulations to you for your level-headed thinking in these dangerous times.

Leslie Spencer
Electronic Communications, Inc.
St. Petersburg, Fla.

Required Reading

Gentlemen: AIR FORCE Magazine continues to be a wonderful source of airpower material to the Department of Military Studies of the Air Force Academy.

We are currently preparing a new course for presentation to the cadets of the class of 1961. We would like very much to make several past articles from AIR FORCE Magazine required reading for cadets of that class.

In order that each cadet may have a copy of these articles, would it be possible for you to authorize us to reproduce them locally?

Col. H. L. Hogan, III
USAF Academy
Denver, Colo.

● *We're glad to grant permission to reprint "The Deterrent," by Sqdn. Leader Michael Crosbie, March '57; "Britain's Defense Budget," by Norman H. Gibbs, July '56; "Behind Britain's New Defense Policy," by Norman H. Gibbs, June '57; "What Kind of Force for What Kind of War?", by John F. Loosbrock, November '56; "Can We Beat the Russians at Their Own Game?", by W. W. Rostow, November '56; "The Nature of Nuclear Warfare," by Dr. Edward Teller, January '57; and "USAF Doctrine and National Policy," by Gen. Thomas D. White, January '58.*—THE EDITORS

AFROTC Pioneers

Gentlemen: An item in your June issue ("Flying Goes to College," pg. 73) concerning Texas A&M College's AFROTC flight program brought back some memories that I should like to again bring to the attention of AFA'ers.

During 1940-41, while I was a student at Louisiana State University at Baton Rouge, one Air Corps Reserve captain named John P. Fraim, Jr., who was a former airline pilot and was then a professor of commercial aviation at LSU, attempted to integrate the college flying club into the ROTC. The club was then operating under the college-phase Civilian Pilot Training Program.

For several years, Captain Fraim was rebuffed by Washington at every turn, to the point where he finally gave up. At that time LSU had the second largest ROTC brigade in the entire country, with artillery, engineers, infantry, and signal corps regiments (Texas A&M had the largest!). But Air Corps? Heaven forbid! Captain Fraim was recalled to EAD during World War II and eventually ended up as CO of the 6th Ferrying Group, Air Transport Command, at Long Beach, Calif. He is now reported to be in the automobile business in Southern California.

A second memory concerns Gill Robb Wilson's daily column in the New York *Herald Tribune*, called "The Air World." In his column of August 27, 1947, Mr. Wilson suggested the organization of AFROTC units in schools such as Louisiana State, Texas A&M, and Alabama, which already possessed ROTC regiments and also had "magnificent airports and shops on or near their own campus."

Many thanks to Lou Alexander and AFA for promoting and publicizing the collegiate flight training of Air Force cadets, which was finally authorized by Congress only two years ago. Wish it had existed when I went to college!

Gerard E. Nistal
Flushing, L. I., N. Y.

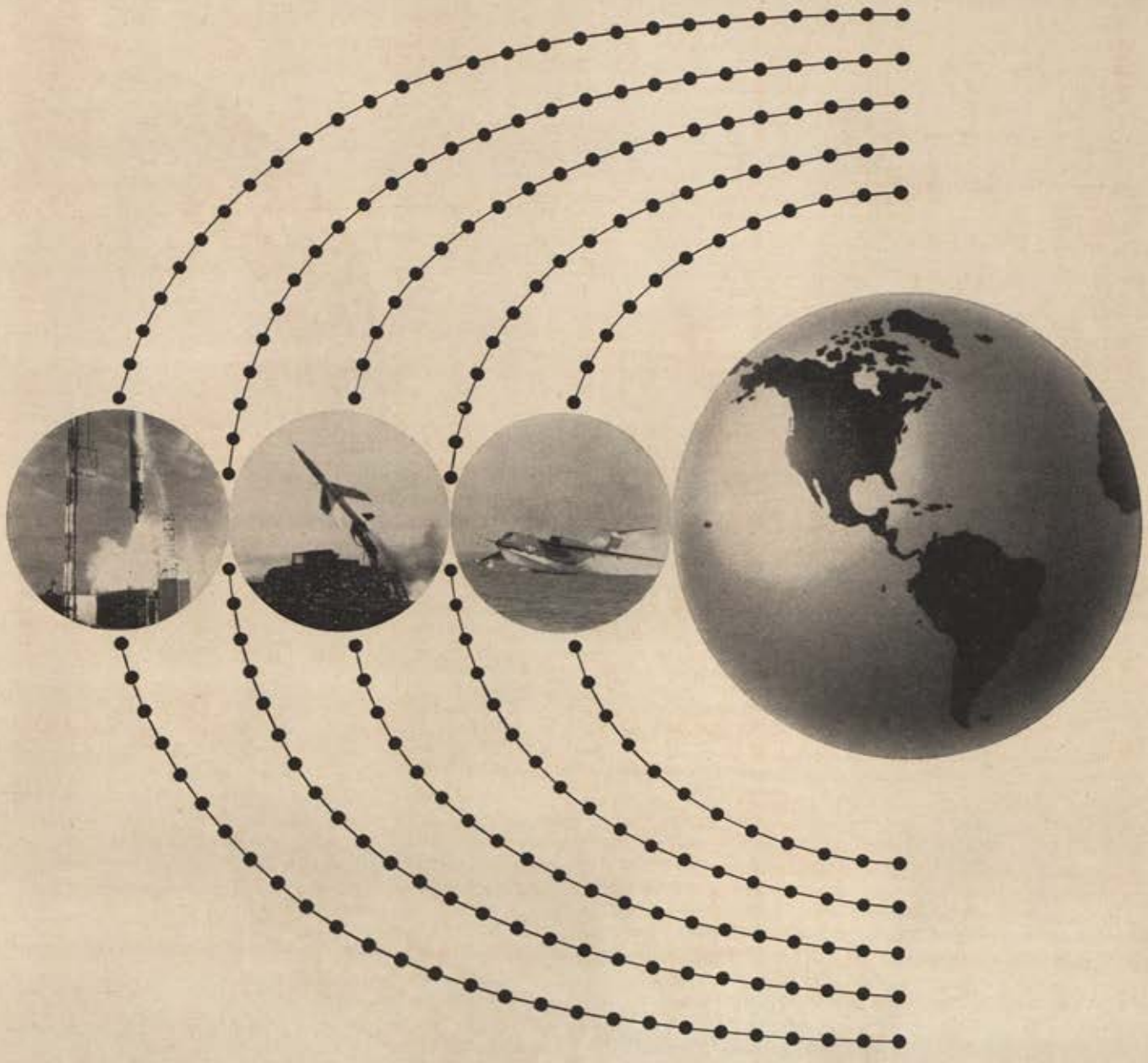
A Lighter Touch

Gentlemen: No one could be more convinced that AFA is a good thing. In fact, I had long, serious talks with Casey Jones and Jim Doolittle when it was established, and a few fringe associations were absorbed to create this powerful, democratic institution. I do, however, have grave doubts that your average reader digests the very high powered editorial material you use. I can understand how a handful of intellectual leaders among the members eagerly await the papers you present, but my memory and experience with the rank and file of our Air Force people seem to indicate to me that you should have more material couched in a lighter frame. I don't mean that your aims should be any less idealistic, but I do mean that the means of presenting them could be somewhat more sugar-coated!

Col. Alfred L. Wolf, USAF Res.
Philadelphia, Pa.

Gentlemen: It would be nice if in future AIR FORCE Magazines you could have an article a month about the history and World War II record of bomber and fighter outfits. Also, along with the articles, perhaps it might be possible for you to print a full-page color reproduction of each outfit's squadron insignia.

Charles F. Pearcy
Pomona, Calif.



INDEX TO ADVERTISERS

AROUND THE WORLD WITH SIKORSKY HELICOPTERS

FIRE FIGHTING S-58—Approaching a blazing gasoline fire, a Sikorsky S-58 delivers aerial fire fighting rig and personnel in a demonstration of the helicopter's capabilities in fighting fires, especially those hard to reach by ground transport. Downwash from rotor blades helps suppress or extinguish fire and protects firemen from intense heat. This unit, carrying 250 gallons of foam, was designed by American LaFrance in cooperation with Sikorsky Aircraft.

DEEP FREEZE III—In the Antarctic, large Sikorsky S-58s have joined the S-55s widely used for the past three years in U. S. activities supporting the International Geophysical Year. Their duties include passenger and cargo transport, reconnaissance, and search and rescue. The version of the S-58 shown above, the Navy HUS-1A utility configuration, is transporting cargo in Little America.

CHOPPER JOHN—Twin-engined Army H-37s (Sikorsky S-56s) airlifted Honest John missiles, launchers, and crews at Project AMMO, a missile demonstration at White Sands, New Mexico, and Fort Bliss, Texas, to show how helicopters provide mobility for Army missiles under combat conditions. Other Sikorskys flying at Project AMMO were H-34s (S-58s) and H-19s (S-55s).

SIKORSKY AIRCRAFT
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One of the Divisions of United Aircraft Corporation

What's New With ★ RED AIRPOWER

Here's a summary of the latest available information on Soviet air intelligence. Because of the nature of this material, we are not able to disclose our sources, nor document the information beyond assurance that the sources are trustworthy.

This year Soviet Aviation Day was held July 20, rather than in June, as predicted by the Soviet air attaché in London. Apparently because the Russians want to emphasize their peace offensive, they made it largely a civil aircraft show. Transport planes were displayed, but no new types were shown.

° ° °

Here are the latest figures on the size of the Russian air forces. Personnel: about 800,000. Aircraft: 10,000 interceptors (jet types); 3,500 fighter-bombers, navy fighters, and related types (mixture of jet and piston types); 5,000 tactical bombers (such as IL-28); 800 strategic bombers (many of which are piston types, but including Badgers, Bisons, and Bears). In addition, there are ten airborne divisions of troops, most of which are flown in twin-engine aircraft, especially IL-12s.

° ° °

Look for a change of commanders of the Soviet armed forces. When Premier Party Boss Khrushchev dropped Marshal Zhukov about a year ago, he moved Marshal Rodion Malinovsky, with whom Khrushchev had worked on the Stalingrad front during World War II, into the top army spot. But now it looks like Malinovsky may be retired on his sixtieth birthday (he's fifty-nine), and be replaced by Marshal Andrei A. Grechko, Deputy Minister of Defense and until recently the Soviet commander in East Germany. Grechko also is an old Khrushchev crony, both from the Stalingrad front and later at Kiev, where the Marshal commanded the local military district and where Khrushchev directed the clean-up campaign among Ukrainians who had been too friendly with the Germans during World War II.

° ° °

In eastern Siberia the Russians now have three air armies, with about 1,700 jet fighters and 800 to 1,000 bombers of various types. Add to these about 2,000 planes of the Red Chinese air forces.

° ° °

Though not yet confirmed, the Russians are supposed to have a new, long-range jet bomber in the works. Its designer is believed to be Pavel Sukhoi, long a Soviet designer, who recently has moved into the foreground with his advanced delta designs. The new Soviet bomber has been designed for six jet engines.

° ° °

Some 3,000 men are employed at Dessau, in East Germany, turning out weapons and materiel for the National People's Army. The work is being done at the World War II Junkers plant.

° ° °

Recently, a Soviet aircraft crashed into the Alta Fjord of northern Norway. It was a delta type, with two jet engines. The crippled aircraft tried to make a landing on the water, but ended up sinking rapidly in about 200 feet of water. The Russian border is about 150 miles away. The Norwegian navy quietly began salvage operations, according to reports reaching AIR FORCE.

° ° °

Two Bulgarian air bases have been enlarged so they can handle jet bombers. Both air bases also will be equipped with various kinds of missiles, for protective purposes and for offense against US bases in the Mediterranean. The Soviets apparently find it advantageous to build their bases as a complex, with several types of weapons in the same area, and huge supply depots nearby. This simplifies the security problem, and to some extent reduces the supply and facilities problem for them.

° ° °

Soviet medium-range missile bases have already been established near Korytsa, Albania. The missiles were brought in by ship from Odessa. A little over a year ago first efforts were made to reorganize and update the Albanian air force. Russian officers are directing the task of instructing the 1,600 ground personnel and 570 pilots of the Albanian air force. A special radar net has been set up in the country to serve as a warning system for the USSR.

° ° °

The First and Third long-range weapon units of the USSR now are stationed near Königsberg, along the Baltic. Launching bases are at Wehlau, an airfield near Königsberg, as well as five other points. Nuclear warheads are stored near Praudinsk. The units are said to be equipped with T-3 and T-4 long-range missiles.

° ° °

Soviet amateur radio operators are being trained in "fox hunt" tactics. These require them to locate "illicit" transmitters which send out messages every five minutes. By using portable receivers, the radio operators must find the transmitter.

° ° °

Designer of Russia's latest VTOL aircraft, the turboplane, is A. N. Rafaelyants, a new name among Russian designers. The first unit has undergone testing under tied-down conditions, in which the flight was restricted by steel cables.

° ° °

Semyon Lavochkin, Soviet aircraft designer whose name has not appeared in Russian print for several years, is designing aircraft on the secret list, according to advices from Moscow.

° ° °

German informants say the Soviets had a 500,000-pound-thrust rocket engine under development in 1950 and had it through the development stages and in production by 1954.

° ° °

Russia has ordered a number of Aero 45 twin-engine courier and liaison aircraft from Czechoslovakia. The aircraft are built at Prague and have been in production for over a year. The Czechs have tried to export the plane to western countries, with little success.

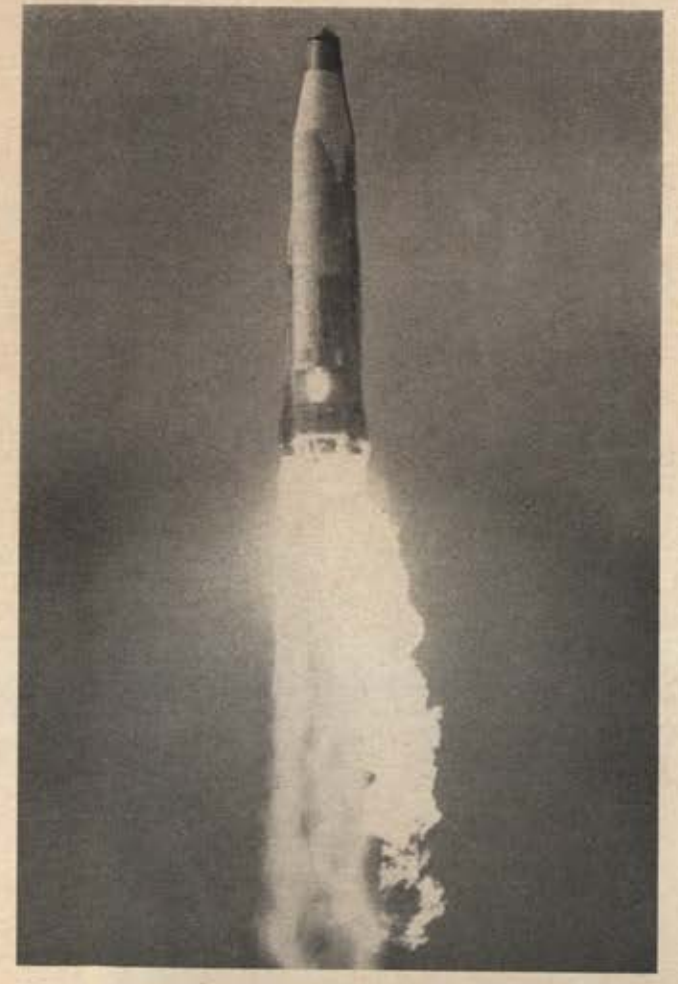
° ° °

The Russians now are testing two IL-18 turboprop transports. The accelerated flight-test program is being conducted from Vnukovo airport, civil field serving Moscow. They also have come up with a new, more advanced version of the huge TU-114. The new model, the TU-114D, flew the 4,200 miles from Moscow to Vladivostok in nine hours. Presumably this flight was made with favorable tailwinds. The Russians are saying nothing about the time for the rturn flight.—END

FLIGHT LINES

One of the giant questions of manned spaceflight may be answered by the Air Force lunar probe, which at this writing was being readied at Cape Canaveral, Fla. Explorer satellites have reported the existence of heavy radiation belts of increasing intensity in their orbits, and the Air Force lunar probe, which will be considered highly successful if it gets within 50,000 miles of the moon, could tell how far out this intense radiation extends.

The tragic death of USAF Capt. Iven C. Kincheloe, Jr., in July (*see page 43*) brought to the fore as the new X-15 pilot-designate thirty-four-year-old Capt. Robert White, a soft-spoken New Yorker, veteran of World War II and Korea. After Kincheloe's death, Captain White, who had been X-15 back-up pilot, was named primary pilot by Brig. Gen. Marcus Cooper. Asked by newsmen how he felt about his new assignment, Bob White said: "I'd feel fine about the assignment, if it had come about any other way. As an individual, Kinch cannot be replaced. He was an entity within himself."



Closer to operational capability is the Air Force's Convair Atlas intercontinental ballistic missile, which in early August made its first full-powered test flight from Cape Canaveral, Fla. Test flight was about 2,500 miles.

USAF ICBM capabilities got a spurt ahead when the first fully-powered Atlas made its first successful test flight in early August. Propelled by its twin booster rockets and the main sustainer (*see cut*), the huge missile was fired a distance of about 2,500 miles, leading to hopes for an early full-range test flight.

Meanwhile, the Air Force Association announced that a feature of its National Convention in Dallas this month would be the first public unveiling of the giant Atlas.

Brig. Gen. Homer A. Boushey has been named to USAF's new top-level post of Director of Advanced Technology. A research specialist for much of his Air Force career, General Boushey, in his new assignment, will supervise Air Force space developments, serving under the Deputy Chief of Staff for Development, and working closely with the Defense Department's Advanced Research Projects Agency. In 1943, General Boushey commanded the first US jet fighter group, which was organized at the time on a secret basis.

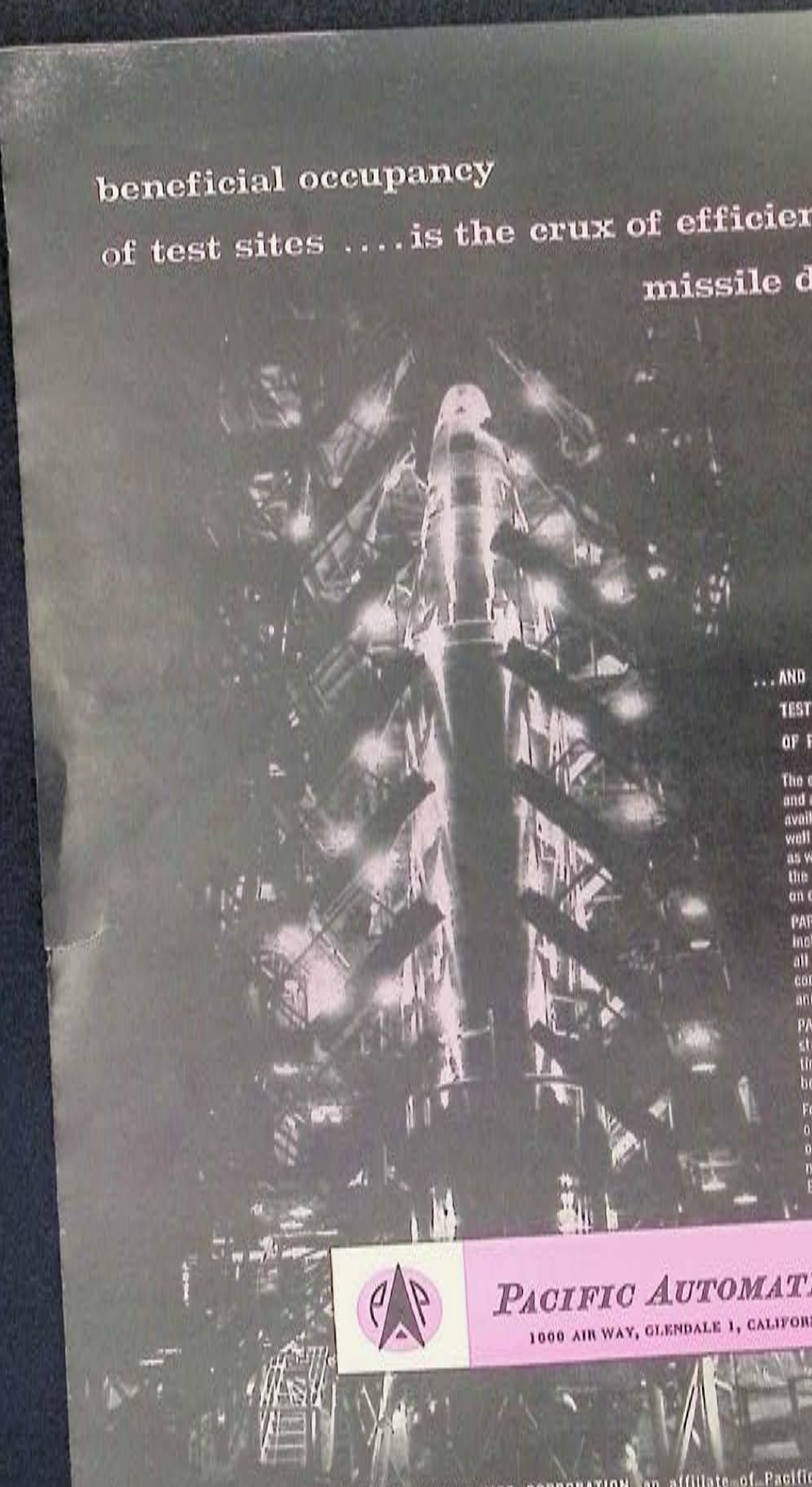
It's not exactly Mars, but spending some time on it may give Air Force aeromedical researchers valuable data on survival at high altitude. A group from the USAF School of Aviation Medicine headed by Dr. Bruno Balke has been camping in and around the peak of 14,260-foot-high Mount Evans near Georgetown, Colo., to determine physical limitations imposed on the human organism by such altitudes. The experiment has shown that healthy humans, after some such exposure, increase their tolerance, become accustomed to breathing more deeply in the rarefied air. Dr. Balke has also reported that, contrary to common belief, people in their thirties and even forties and fifties can stand such altitude stresses. The doctor is fifty-two.

The name of the late USAF Chief of Staff, Gen. Hoyt S. Vandenberg, will be perpetuated as the new designation of Cooke AFB, Calif., the former Army facility now being used as an Air Force missile training base. . . . Also honored with a new name will be Lake Charles AFB, La., to be called Chennault AFB after the famed Flying Tigers commander who died in late July (*see page 42*).

Dr. William Frederick Durand, pioneer in aviation, and original member of the National Advisory Committee for Aeronautics and the "dean of American engineers," died in early August at the age of ninety-nine. Dr. Durand's contributions to aviation include a definitive six-volume work on the principles of gases in motion, *Aerodynamic Theory*. During World War II, Dr. Durand, then in his eighties, was called from retirement to aid in the development of the first American jet engines.

(Continued on page 19)

beneficial occupancy of test sites ....is the crux of efficient missile development



...AND ON-TIME ACTIVATION OF TEST SITES IS THE PRINCIPAL PRODUCT OF PAP'S SYSTEMS ENGINEERING

The enormous benefits in terms of economy and adherence to schedule that result from on-time availability of test and launch sites are well understood by all missile developers. Almost as well known is the fact that every site for the Atlas missile program has been completed on or ahead of schedule.

PAP's vital tasks in this accomplishment have included design, manufacture, and installation of all electronic cable; installation of instrumentation, controls, consoles, and accessories; and checkout and validation of the complete electronic complex.

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Lockheed surveys of USAF training requirements formed the basis for Lockheed designs proposed for 2 trainer versions of the Electra. The advanced Electra navigator trainer and the electronic countermeasures trainer are both ideal for these highly specialized missions. Each combines new concepts of individualized student instruction, safety, performance flexibility and operational economy never before achieved in *one* airplane for Air Force training programs.

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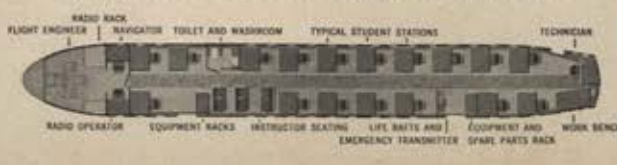

Infrared and ultraviolet rays may prove valuable in the tracking of targets at high altitudes according to Air Research and Development Command. ARDC scientists are studying results of tests using measurements of infrared and ultraviolet rays taken from balloons as high as sixteen miles up. Equipment aboard balloon gondolas includes a scanning device consisting of a reflecting mirrorscope somewhat like the telescopes used by astronomers.

The increasing industrial interest in space technology has been evidenced by such items as Republic Aviation's recently announced $35 million, four-year research program designed to concentrate on moon-probe capabilities and development of weaponry concepts for outer space. Commented the New York *Times* on Republic's announcement: "All friends of the private enterprise system will greet this action. This is an act of enterprise, of risk-taking, in the grand manner . . . the efficacy of the profit motive as an incentive for progress in our society has been proved time and time again. . . ."

Also moving into space development is United Aircraft, which has announced formation of two new divisions.

It's just possible that the first manned spaceship could put Americans and Russians side by side as crewmen. This was the gist of a proposal made at a recent international meeting of International Geophysical Year scientists in Moscow, according to reports from the conference. No Soviet comment was available in press reports on the proposal, nor was the source of the idea given.

The belief that manned craft will retain their place in the aerospace scheme of things was expressed by famed Russian designer A. I. Mikoyan, quoted in the Soviet journal *Komskolskaya Pravda* as asserting that the great differences in speed and altitude now existing between unmanned missiles and piloted craft is a temporary phenomenon. "In the future," said Mikoyan, "these two types of flying apparatus will merge. . . . Obviously the first manned Sputnik will be essentially a superspeed airplane hurled into the upper layers of the atmosphere by a multistage rocket."

STAFF CHANGES. . . . Lt. Gen. Roscoe C. Wilson succeeded retiring Lt. Gen. Donald L. Putt as DCS/Development and Military Director of the Scientific Advisory Board to the CofS, USAF. . . . Maj. Gen. Don R. Ostrander, who was Deputy Comdr for Resources, ARDC, Andrews AFB, Md., is now Assistant for Guided Missiles Production with the NATO Assistant Secretary General (Production and Logistics), assigned to the 1141st USAF Special Activities Sq., Hq. Comd., USAF. . . . Maj. Gen. John B. Cary has been reassigned from duty as Director of Plans, DCS/Plans and Programs, Hq. USAF, to DCS/Plans and Operations, Hq. PACAF, replacing Maj. Gen. John S. Hardy, who became DCS/Plans and Operations, Pacific Comd. . . . Maj. Gen. Richard M. Montgomery, formerly Deputy Comdr, Second AF, Barksdale AFB, La., has been assigned duty as Comdr, Hq. 3d AD, SAC, trading jobs with Maj. Gen. Charles W. Schott.

Maj. Gen. Don O. Darrow has been relieved as Deputy Comdr, Western Transport AF, to become Deputy Chief of Staff, Operations, Allied AF Central Europe. . . . Maj. Gen. Herbert L. Grills has been reassigned from Hq. 3700th Military Training Wg, ATC, Lackland AFB, Tex., to 1141st Special Activities Sq., Hq. Comd, USAF (SHAPE 5th Allied Tactical AF), replacing Brig. Gen. Glynne M. Jones, who was assigned to Hq. 3800th AB Wg, AU, Maxwell AFB, Ala. . . . Maj. Gen. James V. Edmundson has moved up from Deputy Director of Operations, SAC, Offutt AFB, Neb., to Director of Operations, upon the departure of Maj. Gen. Robert H. Terrill, who became AF Member, Joint Strategic Survey Committee, JCS, Wash., D.C. . . . Brig. Gen. Gordon H. Austin was reassigned from Comdr, 20th AD (Defense), ADC, Richards-Gebaur AFB, Mo., to Comdr, 11th AD (Defense), AAC, to replace Brig. Gen. Conrad F. Necrason, who became Comdr, AAC.

Outgoing Chief of Chaplains Charles I. Carpenter, right, beams as USAF Chief of Staff Gen. Thomas White awards him the DSM. The Chaplain's new assignment is at AF Academy.

The former AAC Comdr, Brig. Gen. Kenneth H. Gibson, was assigned as Vice Comdr, Eastern Air Defense Force, replacing Maj. Gen. Sam W. Agee, who was made Comdr, 26th AD (SAGE), Syracuse AF Station, N. Y. . . . Brig. Gen. Ernest H. Beverly, formerly Comdr, 9th AD (Defense), ADC, Geiger Field, Wash., has been assigned as Comdr, Washington Air Defense Sector, and Comdr, 85th AD (Defense), Ft. Lee, Va. . . . Brig. Gen. Arthur C. Agan, Jr., who was Comdr, 26th AD (Defense) and Comdr, 26th Continental Air Defense Division, was assigned as Comdr, New York Air Defense Sector, ADC, McGuire AFB, N.J. . . . Brig. Gen. Don D. Flickinger, Staff Surgeon, Hq. ARDC, Andrews AFB, Md., was relieved from duty as Director of Human Factors and became Director of Life Sciences, with no change in additional duty as Special Assistant for Bio-Astronautics to the Deputy Commander for Ballistic Missiles, ARDC.

Maj. Gen. William T. Hudnell has replaced Maj. Gen. Merrill D. Burnside as Director, Maintenance Engineering, AMC, at Wright-Patterson AFB, Ohio. General Burnside was assigned as Special Assistant to Comdr, AMC. . . . Maj. Gen. Jack W. Wood, formerly Director of Readiness and Materiel Inspection, Office TIG, Norton AFB, Calif., has been assigned Deputy Inspector General for Inspection in the same office. General Wood was succeeded by Brig. Gen. William G. Hipps, his former deputy. PROMOTED: Lt. Gen. Charles P. Cabell, Deputy Director of Central Intelligence, Wash., D.C., was appointed to the rank of general. RETIRED: Maj. Gen. Lee B. Washbourne, Brig. Gen. Earl Maxwell, Maj. Gen. August W. Kissner, Maj. Gen. George F. Smith, Brig. Gen. Robert S. Israel, Jr., Brig. Gen. Edgar A. Sirmyer, Brig. Gen. Ralph E. Koon, Brig. Gen. Lawrence C. Coddington, Maj. Gen. Alvin L. Pachynski, Brig. Gen. Joseph A. Bulger, Brig. Gen. Emmett F. Yost.—END

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Reserve Forces Seminar	Baker
Ladies Fashion Show	Neiman-Marcus
Reserve Forces Workshop	Baker
Panorama Preview	Auditorium

FRIDAY—SEPTEMBER 26

Space Symposium	Auditorium
Airpower Panorama	Auditorium
Space Age Luncheon	Auditorium
Western Wing Ding	Auditorium

SATURDAY—SEPTEMBER 27

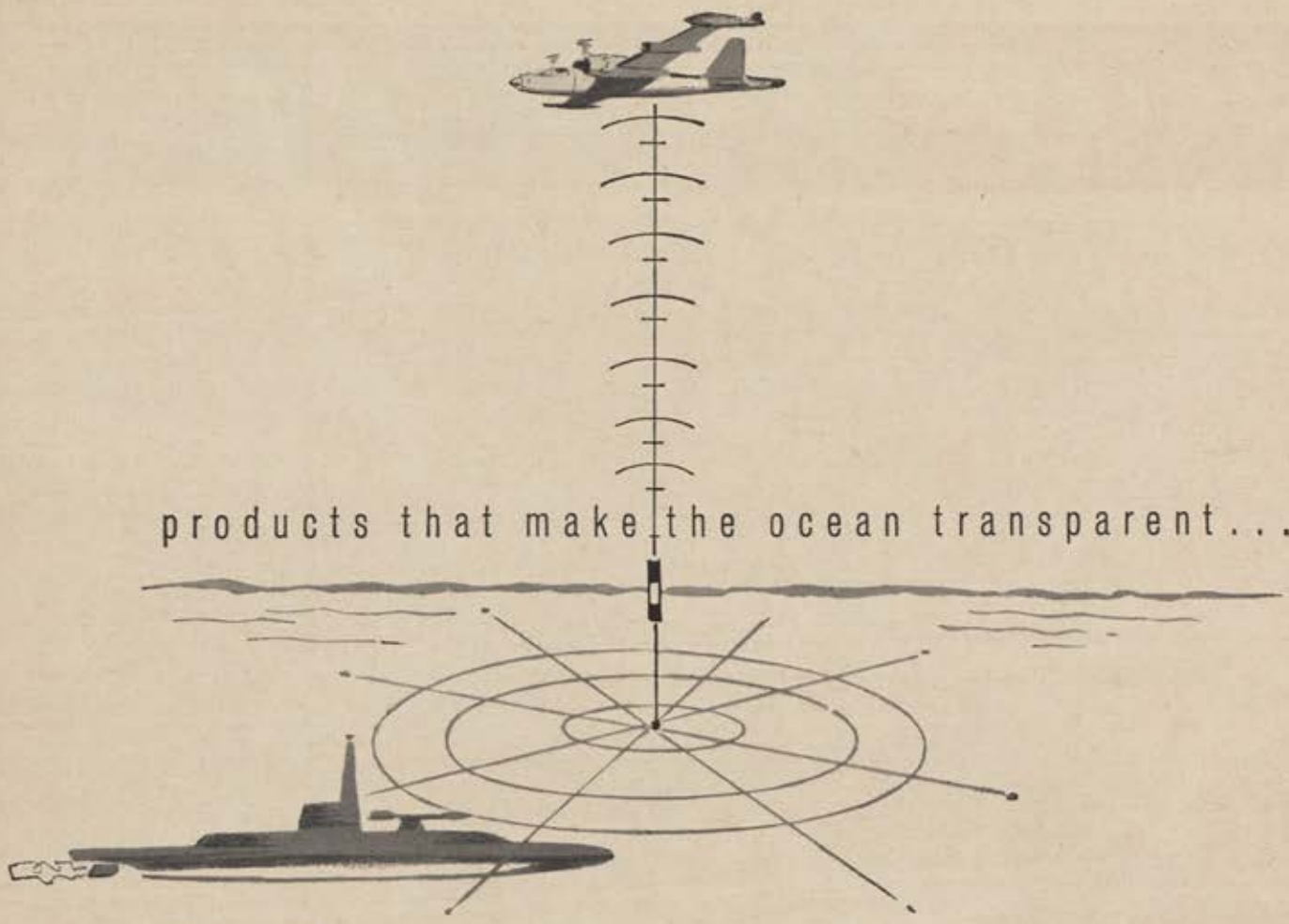
AFA Business Sessions	Adolphus
Briefings for Industry	Auditorium
Luncheon for Industry	Auditorium
Airpower Panorama	Auditorium
Awards Banquet	Auditorium

SUNDAY—SEPTEMBER 28

Roundup Brunch	Statler
AFA Directors Meeting	Statler
Airpower Panorama	Auditorium

Registration Fee—$20.00

(SEE PAGE 91 FOR HOTEL RESERVATIONS)



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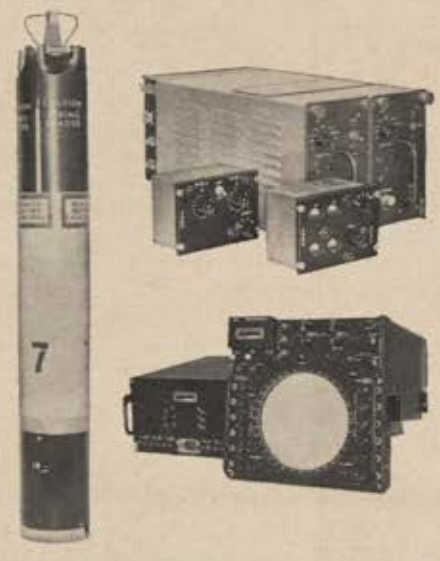
Airborne anti-submarine warfare equipment designed, developed and produced by the Magnavox Company, provides U.S. Navy patrol aircraft with eyes that see underwater by day and by night. The AN/ASA-16 Display System, together with SONOBUOYS, AN/ARR-26 Receiver systems and other associated equipment provide aircraft with a clear picture of the ocean-depths below them. They are part of the continuing contributions of the Magnavox Company in aiding the U.S. Navy to combat the growing submarine menace.



COMMUNICATIONS RADAR DATA HANDLING ASW MISSILES

THE MAGNAVOX COMPANY

FORT WAYNE, INDIANA

VIEWS & COMMENTS

How Much Is Too Much?

The Committee for Economic Development, a respected study group based in New York, recently issued a report which raised some important questions in connection with our defense effort, among them the belief in many quarters that there is a ceiling to our spending which we cannot break through. Some of the Committee's thinking, excerpted from the summary of its report, follows:

IN determining the size of our defense effort, we must distinguish sharply between the limitation imposed by the amount of our total production that we are *willing* to devote to this purpose, at the sacrifice of other desirable uses of output, and the limitation imposed by the consideration that too heavy a defense burden may weaken our economy, and hence our long-term ability to maintain our security.

The amount we are willing to devote to defense is for the public to decide. There is, however, the problem of placing before the citizenry the facts that are necessary for informed decisions to be reached. Frankness and clarity by high government officials are requisites. Congressional and private investigations can be invaluable. Improvements in budgetary procedures and presentations, and strengthening of congressional staffs, are necessary parts of this process. But a full and certain solution is not in sight.

Fear that a high defense burden will weaken the economy has been exaggerated and should not be decisive in the determination of the size of a defense budget representing ten to fifteen percent of the gross national product, or even more. There is no factual basis for the notion that we are within reach or exceeding some "breaking point" beyond which tax-financed expenditures will critically impair economic growth. *We can afford what we have to afford.*

The retarding effect of taxes on growth comes less from the total size of the tax load on the economy as a whole than from an irrational structure of taxes that bears heavily on some categories of taxpayers that are important to growth, is burdensome to saving, and impairs incentives.

While we believe possible restraints on the size of the defense program have been overstated, this does not in itself mean that the defense program should be stepped up beyond present plans. It is possible that the costs of adequate defense have also been exaggerated.

The Realities of Space

In a recent address to an American Rocket Society meeting in Los Angeles, Rear Adm. John E. Clark, USN, Deputy Director, Advanced Research Projects Agency, made some strong assertions on realistic approaches to spaceflight, the uses of man, and the uses of instruments. We reprint an important excerpt:

IT IS interesting to note that . . . actual progress in the rocket field did not follow the line of thinking of the great pioneers. These men all had dreamed . . . about manned space vehicles. They were convinced that only the human being would be able to navigate spaceships so that space could finally be conquered and utilized for the human race. They did not imagine that within twenty years fully automatic, electronic and mechanical devices would be developed to such a perfection that the question could seriously arise: "Do we really need man in space?" They had not the faintest idea of automation.

Maybe history had to make this detour around automation to future manned spaceflight. Now we realize more and more that automation alone may not be the answer. The answer may lie in a clever combination of fully automatic equipment and the reasoning power of man. Only if we let the automatic equipment do what it can do better, and let the man do what he can do best, may we find the correct answer to flight into space.

I do not believe that space will be ours until we are able to maneuver in it. This means we should be able to change our course and to increase or decrease our speed at will. In order to avoid excessive takeoff weight and highly complicated over-all systems for the classical adaptation maneuvers, now a little bit obsolete when we think about using propellants to be taken aloft from the ground, then we need urgently:

A lightweight space engine of small thrust for which the necessary energy will be taken out of space—for example, ion rockets; . . . an onboard navigation and guidance system by which we know at any time where we are, where we are going, and at what speed. We cannot wait during a flight until ground stations or stations on a system of artificial satellites tell us where we are.

When we have done that, I think we will have come to a point where we will be able to use space to the advantage of man. I am convinced that space will be conquered by man and not by an unattended automatic machine. . . .

Alas, the Adjutant

There are words and words—in every language, and some of them have a kind of vigor and richness of meaning which last. To many, "adjutant" has that ring of meaning, and the recent change by the Air Force of the designation "adjutant" to "administrative officer" or "director of administrative services" elicited the following comment by Maj. Charles T. Davis, Air Force Reserve, associate editor of the Arkansas Gazette, *published as an editorial in that newspaper:*

> **Adjutant** (aj'ootant), n. (L. *adjutans*, pres. part. of *adjutare* to help.) 1. a helper; assistant. 2. In present-day armies, a staff officer in charge of the official correspondence, records of personnel, preparation and distribution of orders, etc., of a command. Abbr., *Adj., Adjt.*

IT IS understandable that a military service as new as the United States Air Force would be tempted to alter many of the procedures and customs it inherited from the older armed forces. But it seems to us the Wild Blue Yonder

Boys have committed a needless heresy in a recent order abolishing the term "adjutant" and substituting "administrative officer" at the squadron level and "director of administrative services" for higher headquarters.

"Adjutant" has a certain ring about it that we cannot possibly detect in "administrative officer" (he could be working in a bank or a blivet-manufacturing firm) and certainly not in "director of administrative services." Moreover, the abandoned title is one of the most historical of military terms, dating at least to the days of mailed knights. Traditionally it connotes efficiency and effectiveness, and besides, the adjutant has a truly important place in a parade or review. He echoes the orders of his commander and conspicuously executes the marching maneuver known as the "adjutant's strut" when taking position prior to the passing of the troops in review.

It is true that the Air Force is not as long on drilling as its predecessors, but it is freehanded with medals, and there will always be Air Force parades. For the sake of those who stage them, we trust the Pentagon will reconsider this order. We would find it hard to envision anything called the "administrative officer's strut." And "director of administrative services' strut" is clearly impossible even for the general who dreamed up the directive—and probably for the dispirited former adjutant who processed it.

The Problems of Democracy

Making the world understand American democracy and its hopes for the world is—as we have seen, especially in recent weeks—our toughest job, and Secretary of Defense Neil H. McElroy pointed up this problem in his recent Commencement Address at Harvard University. Some cogent excerpts follow:

THERE was *never* a time in our history as a nation when it was *more* necessary to explain the virtues of our kind of democracy. New—fresh—appealing, it offers the kind of freedom and human dignity that peoples of the world have *always* stood in line to buy.

One of those who came to our country over a hundred years ago to analyze our fresh brand of democracy was the French scholar Alexis de Tocqueville. He came to our shores in 1831—not to stay and become one of us—but to analyze our brand of democracy as a form of government, to compare it with other governments and social systems of the day, and, finally, to estimate its chances for survival in the long-distance competition for man's mind.

De Tocqueville was the first to envisage the probability of a clash between the social system emerging in America and that already existent in Russia, which even then hung like a dark cloud over the world.

He was one of the first to compare the emerging social orders in Russia and our own United States. I don't believe I could improve on his description of the basic differences in our societies—even though his words were written 125 years ago:

"The American," he wrote, "relies upon personal interest to accomplish his ends and gives free scope to the unguided strength and common sense of the people; the Russian centers all the authority of society in a single arm. The principal instrument of the former is freedom; of the latter, servitude.

"Their starting point is different and their courses are not the same; yet each of them seems marked out by the will of Heaven to sway the destinies of half the globe."

. . . What particularly interests me about De Tocqueville is not so much that he foresaw the inevitability of competition between our system and Russia's—remarkable as was his prescience—but that he probed so accurately . . . to reveal what would be our great *strength* and *weakness* in any real struggle for survival. He recognized . . . and stated:

"It is incontestable that, in times of danger, a free people display far more energy than any other," but he added:

"Democracy appears to me better adapted for the conduct of society in times of peace, or for a sudden effort of remarkable vigor, than for the prolonged endurance of the great storms that beset the political existence of nations. . . .

"If a democratic country," [De Tocqueville] concluded, "remained during a whole century subject to a republican government, it would probably at the end of that period be richer, more populous, and more prosperous than the neighboring despotic states. But during that century it would often have incurred the risk of being conquered by them."

. . . As our friend De Tocqueville might express it—it is necessary in a democracy like ours "to rouse the whole community from its peaceful occupation and ruin some of the minor undertakings of the people" before they will turn their full attention from pursuit of their private affairs to meet a great public danger.

He believed that we might fail to rally the public cause except under the obvious pressure of a war for survival. He had doubts that we as a people could, or would, react to danger in time of peace with the same degree of passion as in time of war.

We have twice in our history—under the pressure of total war—rallied the strength of our nation . . . we cannot again depend on the spur of war for one of those "efforts of remarkable vigor" of which we have been capable in the past.

We must be alert *at all times* to meet the new challenge. . . .

More Shocks Ahead

THE launching of the first Sputnik shocked us into a momentary confrontation with reality. Some of us recognized that for years this nation had wallowed in a kind of fools' paradise in jolly and supercilious complacency while elsewhere others of more serious bent had worked.

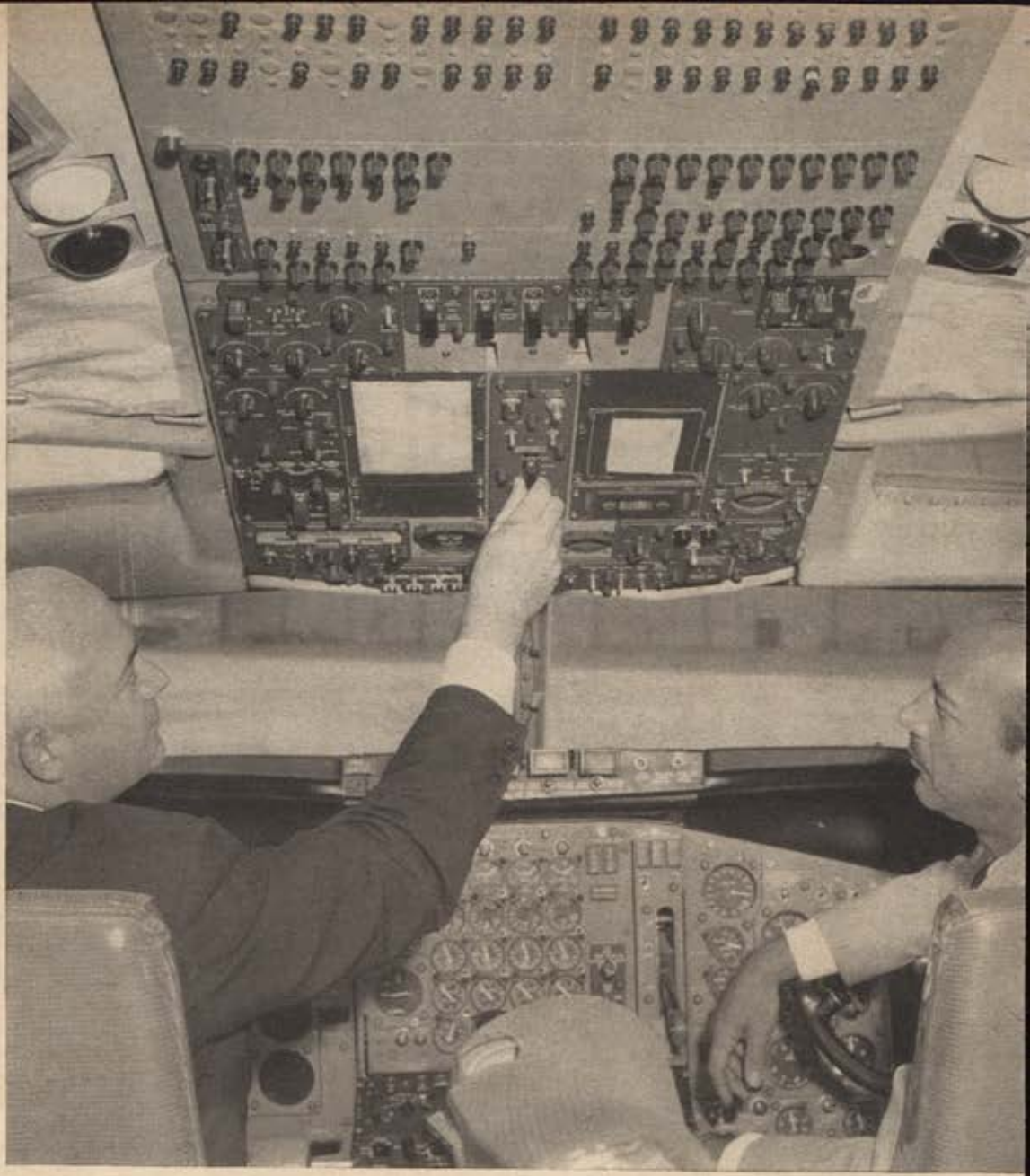
There was a realization that we had seriously neglected education. There was a realization that others had labored while we had loafed.

The reformation was momentary. The smug and apathetic tendencies of our leadership soon spread to the rest of the nation.

One thing is certain, if we go on as we are, more shocks await us in the not too distant future and in many parts of the world.

—From an address on the Senate floor, Wednesday, August 6, by Senator J. William Fulbright, Democrat of Arkansas and a member of the Senate Foreign Relations Committee.

Veteran test pilot Fisher gets 707 flight test checkout from long-time friend Tex Johnston, Boeing Chief of Flight Test.



Noted test pilot gives a behind-scenes operational report on America's first jet airliner . . . another in Champion Spark Plug Company's series on aviation history in the making

FLIGHT TEST, 707!

by HERB FISHER
International aviation authority, veteran test pilot, author

The 707 seats 112 to 180 passengers. New York to London, 6½ hours! Pan American starts first jet service to Europe this Fall.

That "greatest-yet" moment in American aviation history—dawn of the commercial jet age—stands at zero hour. Pan American has just taken delivery on the first of 23 Boeing 707 turbojets. Other airlines will put Douglas, Convair and Boeing turbojets in service in the months to come. It's been a long count-down . . .

The 707, designed to cut existing passenger schedules in half, was first flight tested on July 15, 1954. A transcontinental speed record was almost automatic—Seattle to Baltimore, 3 hours, 48 minutes; cruising speed, 612 mph.

As a test pilot who's flown about every type of transport including the 707, I'll say right now it's impossible to describe the performance difference between the 707 and conventional aircraft. The 707 is a pilot's dream as well as a passenger's. It's easy to fly. Its performance is superb . . .

You flick a switch. Champion jet igniters fire three- to four-inch bursts into the combustion chambers every second for 30 seconds. The 112- to 180-passenger aircraft comes alive instantly. No warm-up necessary. Flight test is on.

Releasing brakes for takeoff, you realize in an odd moment of pride-spiked humility that your finger tips command $5 million of precision-built aircraft—and 60,000 pounds of thrust that's going to ram skyward *a mass nearly twice the weight of today's big propeller airliners.* The 125-ton ship breaks ground at 150 knots. You feel a surge as retracting land-

ing gear and flaps reduce drag. Soon you're at 300 knots indicated. Your rate-of-climb is more than double that of present-day aircraft.

I climbed to 35,000 feet in 13 minutes.

Cruising at 600 mph between 30,000 and 40,000 feet—well above weather and where jets perform best—you sit back, smile, look around. Absence of piston-engine throb delights you. There's practically no vibration. You hear turbines whine but faintly. Aft, passengers will hear only a faint whistling, will not be buffeted by ordinary turbulence.

You check your 20 engine instruments again. It's quick and easy: All needles are parallel during normal operation. All the pilot need do is watch for a needle off parallel!

Pilots, the simplicity and honesty of jet control is like a prayer answered. Gone are prop synchronizer, supercharger, cowl-flap, mixture, carburetor-heat and prop-pitch controls and mag switches. Primary flight controls are 100 per cent manually operated. No power-boost. Spring tabs cable-connected to wheel and rudder pedals actuate controls. Internal pressure balances provide low control forces for low-speed maneuverability and higher forces for high speeds where abrupt maneuvers aren't desired. End result—"natural" feel. No sluggishness, no over-sensitivity.

Mid-span, high-speed ailerons supplemented by hydraulic spoilers and (when flaps are down) use of outboard, low-speed ailerons simplify lateral control. This permits safe operation from airports with a 90° crosswind of 30 mph, and the spoilers provide speed brakes for a wider choice of approach angles.

Power control is simple as a broom handle. A single lever mechanically connected to a hydro-mechanical regulator on the engine slows and speeds the plane. Fuel-air ratios take care of themselves.

For dual reliability, each engine has normal tank fuel flow plus two independent electric boosters. Engine-driven pumps feed fuel if the electric pumps are lost. In emergency, a manifold line may draw fuel from any tank. Likewise, the 707 has two independent hydraulic systems for actuation of spoilers, flaps, landing gear, nose-gear steering and brakes.

Even over air-turbulent Mt. Rainier, 707 passengers will experience but slight, springy motion.

You put the 707 through her paces. Then—the crucial moment: *You simulate flameout*, though chances of it happening are slim. Engine is dead. And the life-trigger—the jet igniter—has been in this jet furnace *enduring temperatures of thousands of degrees for hundreds of accumulative flight-test hours* . . .

Flameout. You take comfort in the knowledge that Champion's long history of spark plug development includes *unique* know-how with jet igniters dating back to the birth of experimental jet engines—those built by General Electric in wartime 1943! And that Champion was first with jet igniters in military aircraft—and has held that lead since . . .

You flick the switch. Two jet igniters spit lightning into the dead turbine. The big Pratt & Whitney engine flashes to life.

Flight test secure, you descend comfortably at 10,000 feet a minute. With speed brakes, single-motion power control and provision for lowering wheels at cruising speed, slow-down distance is but *two miles*. Go-around safety is assured. The big ship maneuvers easily in the traffic pattern.

The 707 goes into service as the most thoroughly tested airliner in history, Tex Johnston, one of the great test pilots, tells me. It's backed by 24,000 hours of wind tunnel testing, 1,500 hours of flight testing—plus the performance record of its military counterparts.

Likewise has the reliability of the vital Champion jet igniter been established—15 years of testing and performance in military aircraft operating under grueling conditions, four years in exhaustive 707 flight testing. Champion's depth of experience and demonstrated ability to make metal and ceramic parts capable of perfect functioning in fantastic temperature ranges led Pratt & Whitney to Champion when the J-57 engine was being developed. A jet igniter must not only be capable of re-igniting the turbine at critical altitudes and speeds, it must deliver instant starts on takeoff day after day.

Today Champion is teamed with engine manufacturers in advanced jet engine development and remains the greatest volume producer of jet igniters in the industry—hence the superior igniters at much lower competitive costs.

Tomorrow . . . well, this is *it* for Pan Am, American Airlines—and the 707!

Champion Spark Plug Co. • Toledo 1, Ohio

. . . salutes the Boeing Airplane Company

Airframes in assembly at Seattle. Boeing takes extra pains with 707 airframe structural safety and endurance.

Fisher and Rudolph Blazek, Experimental Pre-flight Foreman, inspect Champion jet igniter in 707 turbine.

AIRPOWER in the news

COLORADO SPRINGS, COLO.

■ US Air Force Academy cadets have moved into their new home and are shaving each morning in front of medicine cabinets that cost about $75 each. They are attending classes in rooms with a floor-to-ceiling blackboard on the front wall and dropping their books on library tables that cost $53.44 each. None of these items are found in the schools of Yucaipa, Calif. (population, 1,515), or in the House Office Building in Washington. Because they are not used in Yucaipa or Washington, USAF has been having a great deal of trouble. The trouble is not entirely with congressmen. Some of it is with segments of the press. Roughly one reporter out of fifty comes from some place like Yucaipa.

It doesn't make much difference to Yucaipians that a $75 medicine cabinet is really two cabinets, one on each side of a large mirror covered overhead by a light. It is provided with two electric outlets and insulated to block transmission of noise from one room to another. It is built on a steel structure almost six feet long and thirty inches high and is installed as a single unit. The floor-to-ceiling blackboard doubles as a building material, will last virtually forever, and should never require attention from the maintenance department. It also has utility. The library table will not be used to serve coffee, despite its size, and is not expensive, considering its durability.

These are some of the things you can learn with a visit to the recently maligned Academy. The point to remember is that the Academy was designed and furnished for the strictest utility and a minimum of maintenance.

At this point, there is nothing to be gained from arguing the issues any longer. Back around the first of August, USAF was caught in crossfire as the Democrats opened up on an all-Republican Administration project. Some of the newspapers found headlines in the copy, despite its inaccuracies. It should be enough to say that the Academy is a credit to the country and to the USAF officers who have been in charge of its construction. (*See page 75 for a rundown on the progress of construction at the Academy site.*) The amount spent on construction, so far, is about $143 million. The total spent so far is about $160 million, and it is estimated that $190 million will be the final price tag. Contrary to what you have read in some of the papers, these figures were not "admitted" by USAF Secretary James H. Douglas. He declared them.

Of real significance to USAF is the selection of Col. Benjamin P. Blasingame, for the past two years director of the Titan ICBM program, to head the Academy's new Astronautics Department, the first of its kind in the nation's educational system. His first classes started this month with members of the senior group. The course in astronautics is only one of ten in the area of basic and applied sciences offered to the cadets. Here is the full curriculum, in terms of credit hours:

General Education:

SOCIAL SCIENCES AND HUMANITIES

Geography and Cartography	5	
American and Comparative Governments	5	
Economics	5	
History, including Military History	12	
Law	5	
International Relations and Defense Policy	5	
Philosophy	3	
English	15	
Foreign Language (French, Spanish, German, or Russian)	10	
Psychology and Leadership	5	
Total Social Sciences and Humanities	70	

BASIC AND APPLIED SCIENCES

Mathematics	17	
Physics, including Nuclear Physics	12	
Chemistry	6	
Human Biology	1	2/3
Electrical Engineering	7	1/3
Engineering Drawing	2	
Mechanics	6	
Thermodynamics	6	
Aerodynamics	6	
Astronautics	6	
Total Basic and Applied Sciences	70	
Total of General Education Program	140	

MILITARY AIRMANSHIP

Military Studies	9	1/3
Flying Training	11	
Physical Education	5	2/3
Total Military Airmanship	26	
Grand Total of Prescribed Curriculum	166	credit hours

Flying training includes a full course in navigation, leading to the aeronautical rating of navigator upon graduation; a two weeks' introduction to pilot training; familiarization flights with experienced pilots in jet aircraft; and soaring. Full-scale pilot training comes after graduation.

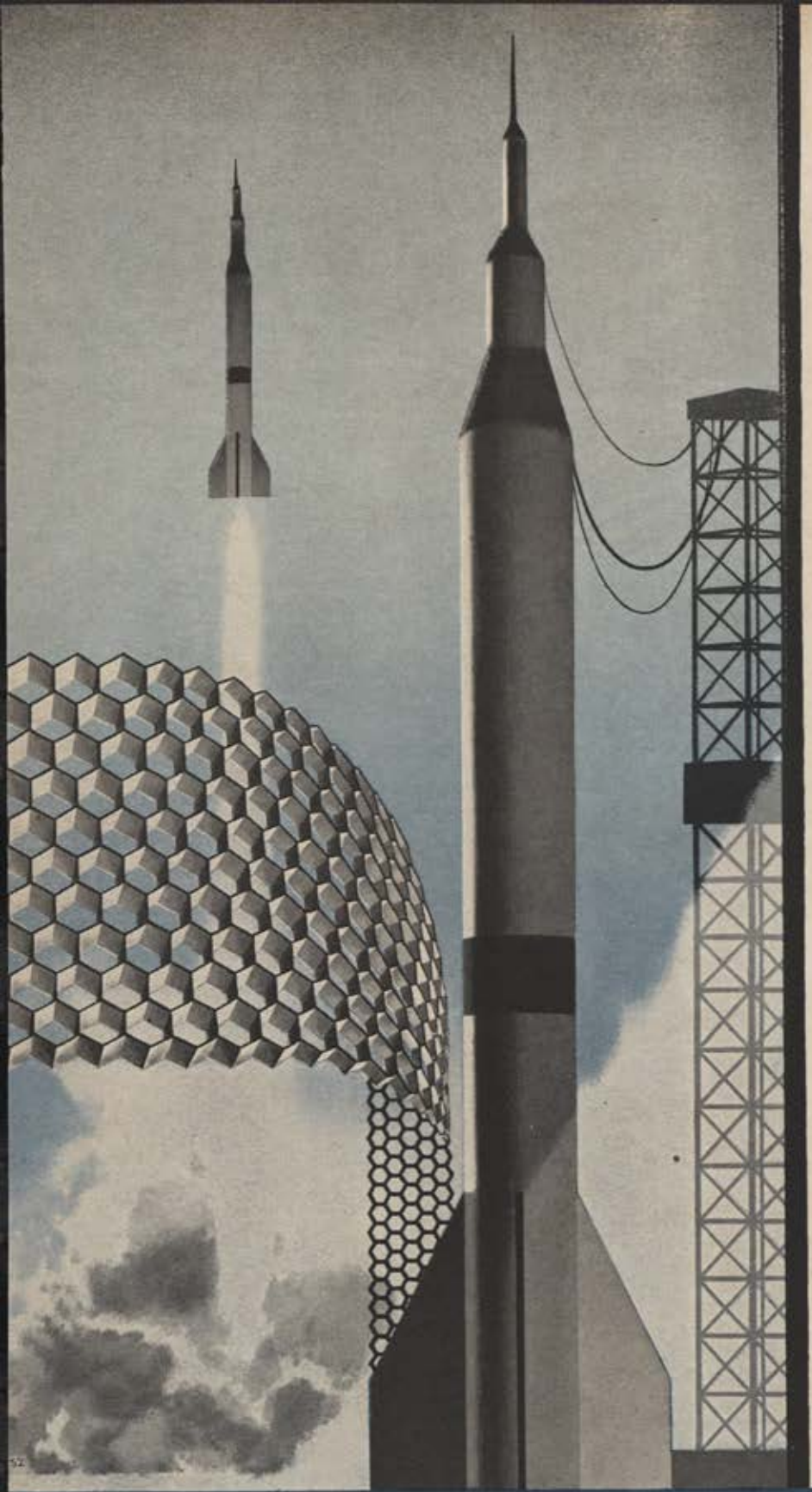
Maj. Gen. James E. "Buster" Briggs, USAFA Superintendent, makes a strong point of the prime task of providing "motivation and dedication to the service career." There has been a lot of attention given in recent years to the alacrity with which valuable officers give up their commissions to accept opportunities in the more rewarding world of commerce. This has been a particular burden to USAF, and there is a strong suspicion that one of the reasons is the lack of an Academy.

General Briggs points out that only fourteen percent of USAF officers commissioned from Reserve Officer Training Corps sources stay in uniform more than five years. Of those commissioned in USAF out of West Point and Annapolis, seventy-five to eighty percent respectively still are in the service five years later. There has been no mention of this before the House Appropriations Committee, or if there has, the newspaperman from Yucaipa didn't write about it. There are no sexy headlines in the fact that the Academy is a good investment for the American taxpayer, but that's the hard truth of it.

WASHINGTON, D.C.

■ For the record, and to disturb such ex-cabinet members as George Humphrey and Engine Charlie Wilson, it now is possible to give some final arithmetic on the fiscal 1959

(Continued on page 29)



Steel structures for space... from Crosley

Today's missiles require materials that are lighter, stronger and more heat resistant. Such requirements make Avco-Crosley a leading contender for building missile frames and structures.

Avco-Crosley is a pioneer in the development of stainless-steel honeycomb, a structural material that is cutting deep into the "thermal barrier" that so long has limited the speed at which planes and missiles travel through the air.

Using stainless-steel honeycomb, it is now possible to build structures with great heat tolerance and high strength/weight ratio: with the strength of solid steel, yet weighing only one-tenth as much.

Together with its associated Avco divisions, the Crosley Division now provides facilities and personnel for:

- *Weapon systems management, from initial concept to production.*
- *Research, development and engineering design of: missile nose cones, air frames, electronics, control systems, telemetering, automatic test and support equipment, ground handling equipment and logistics.*
- *Production and manufacturing for missile and aircraft systems.*

For more information, write to: Vice President, Defense Products Marketing, Crosley Division, Avco Manufacturing Corporation, Cincinnati 25, Ohio.

Avco // Crosley

surface-air
time-division

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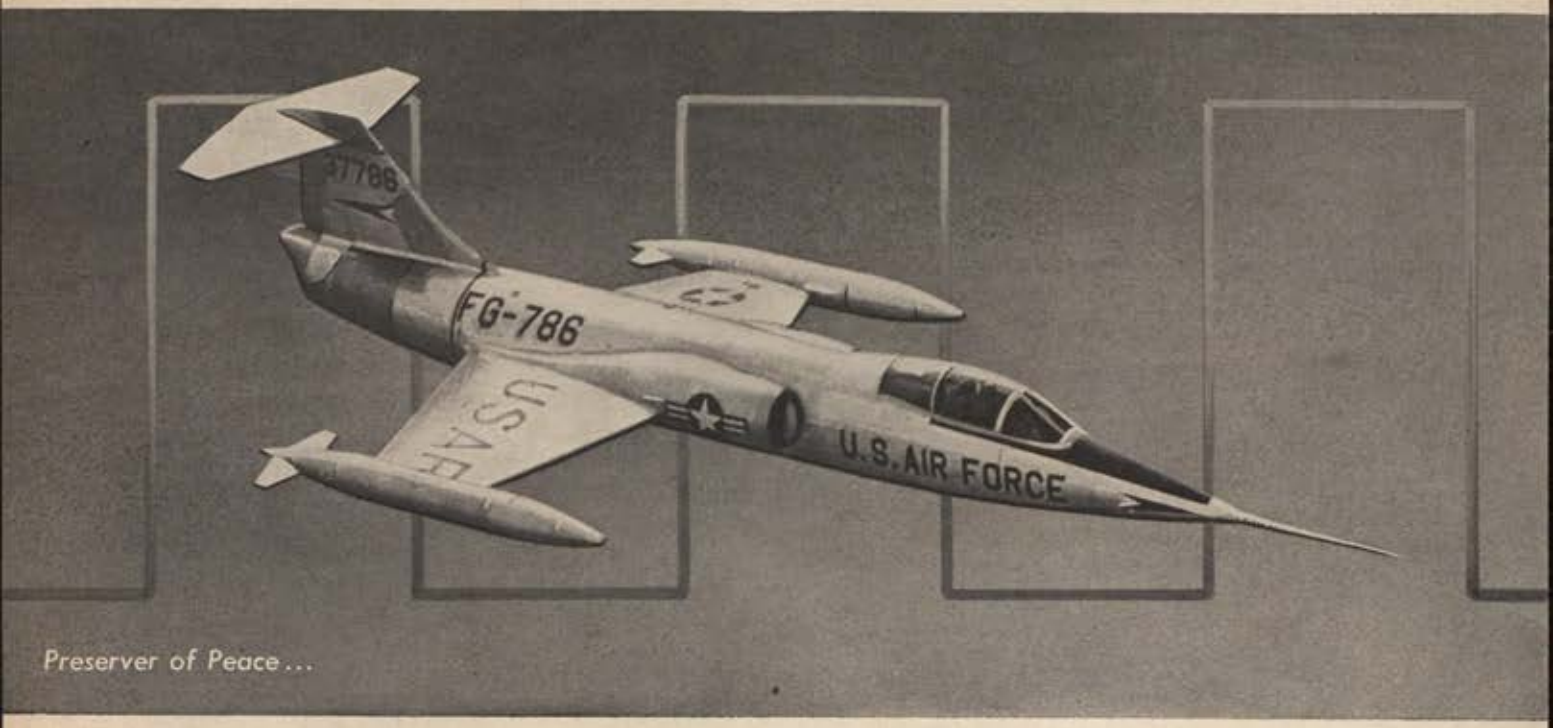


Preserver of Peace...

Developed and produced by Radio Corporation of America for the U.S. Air Force, the Time-Division Data Link system employs digital transmission for the transfer of control information between ground environments and airborne systems. The use of digital techniques of high-speed computers brings the concept of automation to the field of communications and guidance of airborne weapons systems. Applications of the system are: *ground controlled intercept, missile guidance and control, return to base, en route air traffic control, automatic landing systems, tactical support.* This new RCA development is compatible with NATO Data Transmission Specifications, and is of important significance both to military and civilian flying.

RADIO CORPORATION of AMERICA

Tmk(s) ®

DEFENSE ELECTRONIC PRODUCTS

CAMDEN, N. J.

Department of Defense budget. This is the year that ends next June 30. The total budget, agreed to by House and Senate conferees, is $39,602.8 million, up from $34,499.8 million in fiscal 1958. For the Air Force, there is an increase of $1,557.4 million to bring the new total to $17,877.6 million, up from $16,320.2 million last year.

In view of how long the struggle has taken, it is highly significant that the research and development effort is receiving a substantial boost. Now that Mr. Wilson is out of the Pentagon and we seem to have an interest in what is on the other side of the moon, the total R&D funding is up $964.7 million. It went from $1,618.2 million to $2,582.9 million. Of course, a big chunk of this is the $520 million allowed for the Advanced Research Projects Agency, but almost equally interesting is the generous help for the Navy. Navy's R&D funds will climb from $527.2 million to $821.2 million, up $294 million. Army takes second place with a jump from $400 million to $498.7 million. USAF's R&D increase is smallest: up from $691 million to $743 million. Because equipment for the space mission is basic—and expensive—it is safe to assume that much of the ARPA funds will go into upstream work on future USAF vehicles.

For the conventional item of aircraft, missiles and related procurement, the Air Force will receive $6,643.4 million, up from $5,886 million. Purchase of other materiel comes to $2,220 million, increased from $1,531.5 million. Again, the funds allocated for USAF operation and maintenance are cut, down to $4,053.9 million from last year's $4,092.1 million. Also, funds for spare parts are about $75 million below the request. The USAF total in the new budget is greater than the recommendation, by about $225 million, but there is no law saying USAF must spend all the earmarked dollars.

Congress did some arguing about what should go in and what should be taken out of the budget. The Senate Appropriations Committee inserted money for thirteen additional Boeing B-52Gs, thirty Boeing KC-135 jet tankers, and thirty Fairchild F-27 turboprop transports. It also added $140 million for strategic airlift and money for a utility jet transport. In conference with the House the bombers, turboprop transports, and half of the tankers were deleted. Even before the conference Congress had inserted additional money for the Minuteman solid-fuel ICBM project and for Hound Dog, the air-to-surface missile designed for the B-52G.

The Senate Appropriations Committee reported that it is "pointedly concerned" with USAF's program allowing some manufacturers to build test facilities for use in rocket and missile development. It pointed to Holloman Air Development Center, said it is a well-equipped range, and accused USAF of letting government facilities stand idle while industry is allowed to build new ones. Holloman, of course, is in New Mexico and it just happens that the chairman of the committee is Dennis Chavez, who also hails from that state.

The committee also picked Air Force as the logical agency to press the space program and said it is going to examine the Air Research and Development Command to make sure full use is being made of USAF's talents in this field. It scolded USAF, rapping its knuckles for an alleged "lack of energy" in space activity. When the investigation gets under way, we hope somebody calls it to the committee's attention that the political administration got there first and told ARDC space is a dirty word. That was just before Sputnik I went up, at a time when one of the top Department of Defense bosses (name supplied on request) told USAF the Russians wouldn't do it for five years.

Left, T. Keith Glennan, head of the new National Aeronautics and Space Administration (NASA). His deputy is Dr. Hugh Dryden, right, who has headed the earlier NACA.

Somebody else should have the committee review the incident of early this year, when USAF's Deputy Chief of Staff, Development, exhibited a little energy and set up an office to deal with astronautic matters. The Department of Defense made him withdraw the announcement and proclaimed to the nation, gaping upward at Soviet satellites, that USAF was "premature." If Congress wants to do something about these matters, more power to Congress. It should start when it approves key Pentagon appointees.

■ Launching last month of the new National Aeronautics and Space Administration (NASA) found Dr. Hugh Dryden, a scientist who holds the respect of scientists, passed by in the selection of an administrator for the agency. It had been assumed from the beginning that Dr. Dryden, whose competence never was questioned while he headed the parent National Advisory Committee for Aeronautics (NACA), would get the post. Instead, it is being filled by T. (for Thomas) Keith Glennan, president of the Case Institute of Technology. Dr. Dryden will be his deputy.

There is some irony in the fact that Dr. Dryden did not win political favor. To begin with, he helped draft the NASA legislation and more or less fathered the entire Administration program and guided it through Congress. More striking, the thing he ran afoul of was the conviction of some House Space Committee members that he was not asking for enough money. Then, no sooner did Mr. Glennan get the appointment than the Senate Appropriations Committee decided he had asked for too much and slashed $50 million off the NASA budget. At this writing, the Senate has just replaced the cut, bringing NASA's funds back to the $343.1 million recommended by the Administration. This figure is reached by adding $101.1 million originally earmarked for NACA to $117 million that will come from the Department of Defense and $125 million of new money.

Dr. Dryden is a big man, one of the biggest in the service of this country, and if there is any skin off his nose it won't show. Considering the caliber of a lot of recent appointments that will not be listed here, the choice of Mr. Glennan sounds fortunate. Like Dr. James Killian, the president's scientific adviser, he is not a scientist but a scientific administrator. There is no doubt about it, he was tapped for the post by Dr. Killian, who was his

(Continued on following page)

predecessor as chairman of the board of the Institute for Defense Analysis. Incidentally, IDA is reputed to hold a strong position in the direction of the Pentagon's Advanced Research Projects Agency, which will provide most of the $117 million of NASA money that will come from the Defense Department.

Mr. Glennan, fifty-three years old and a native of North Dakota, has a degree in electrical engineering from Yale and won his first claim to fame working on Hollywood's early sound picture equipment back in the late twenties. He once was director of the Navy's Underwater Sound Laboratories and was appointed by President Truman as a member of the Atomic Energy Commission, where he served from 1950 to 1952. He is a member of the board of the National Science Foundation and still serves on AEC's General Advisory Committee.

The Glennan appointment was a surprise, but not one that will make friends of NASA unhappy. With Dr. Dryden at his elbow, the new agency is off to a good start.

■ There are times when it becomes necessary to hand words of praise to a congressman for a good job, well done. Let us all do that for California's Democrat, John E. Moss, who is conducting an intelligent fight for freedom of information. The White House has signed a one-sentence law recommended by Mr. Moss. It says simply that department heads cannot withhold information from the public because a 1789 statute gave them authority to make regulations for the control of records. The old law was being abused.

Because this brings up the entire subject of the press, this is a good place to hand a kudo to Gen. Thomas D. White, Chief of Staff of the USAF. Not long ago, Drew Pearson says, the general called him up and said he had been told Pearson inquired whether or not General White had been in an accident. "I was," said the general. "I don't like to be in accidents but I also don't like any cover up and I'm glad to tell you the facts. I was in a helicopter that crashed on a recreation fishing trip in Labrador."

General White, in this case, took the edge off a good story for a nationally circulated columnist by the oldest technique in the business: telling the truth. The general is qualified to conduct a class in Public Relations at the Pentagon.

■ With relatively minor changes, the Eisenhower program to reorganize the Defense Department is now a law. It is a safe assumption that with what the law fails to do it still is a good evolutionary step toward the single service endorsed by the Air Force Association as the only real solution to the defense organization problem. At the Pentagon, the Chiefs of Staff have set up a tentative timetable for the assumption of operational control over unitional career pool, along with some selectees who have been abolished, and the Joint Chiefs are preparing to take on another 200 officers. USAF expects to contribute about a third of them, mostly out of the planning and operational career pool, along with some selectees who have had good Pentagon staff experience. It will be about the first of the year before the changes are in working order. USAF is slated to lose one assistant secretary, but we have not been able to stir up any speculation about which chair will be abolished.

Major concern of observers seems to lie in the new Director of Research and Engineering. Secretary McElroy's office says it is not easy to fill the post, a fact that is easy to understand in the light of recent history. When it is filled, how much power will the director have? It sounds much as if he will be heading a fourth service, such as the British have, and will be an operating deputy to the Secretary of Defense. William Holaday, the Director of Guided Missiles, is rumored to be working hard for preservation of his empire, although it is not clear why he should have one under the new setup. The Advanced Research Projects Agency certainly will be continued and on the basis of technical competence has much more money in the bank than the Holaday shop.

The shakeup has started already in the area of public relations, and McElroy's office is determined to carry out centralization as much as possible. The real danger here is that thought will be controlled just as much as, or more than, the release of information.

■ The law creating a Federal Aviation Agency (FAA) apparently is written to insulate the new group from military influences as much as possible. The $22,500-a-year civilian administrator will have a deputy, and the deputy may be enlisted from the armed services. It is not compulsory that he be in uniform, and if the top boss is a former military officer it is definitely *verboten* for the deputy to have any present or former rank in the defense organization. The bill says it wants to insure that military interests are safeguarded and says the administrator will include men from the Army, Navy, Air Force, Marines, or Coast Guard among personnel carrying out FAA functions. Twice a year Congress asks for a report on how many jobs are filled by military personnel.

The Federal Aviation Act retains the Civil Aeronautics Board to pass on fare applications and route allocations among the airlines. It abolishes the Civil Aeronautics Administration, thereby stripping the Commerce Department of its biggest agency. We have seen no tears of regret pouring down Constitution Avenue. The bill is 242 pages long and far too complicated for summary in AIR FORCE Magazine. But we do think it should be pointed out that the law was made necessary, for the most part, by traffic congestion, and that the Air Force was involved in the accidents that precipitated action.

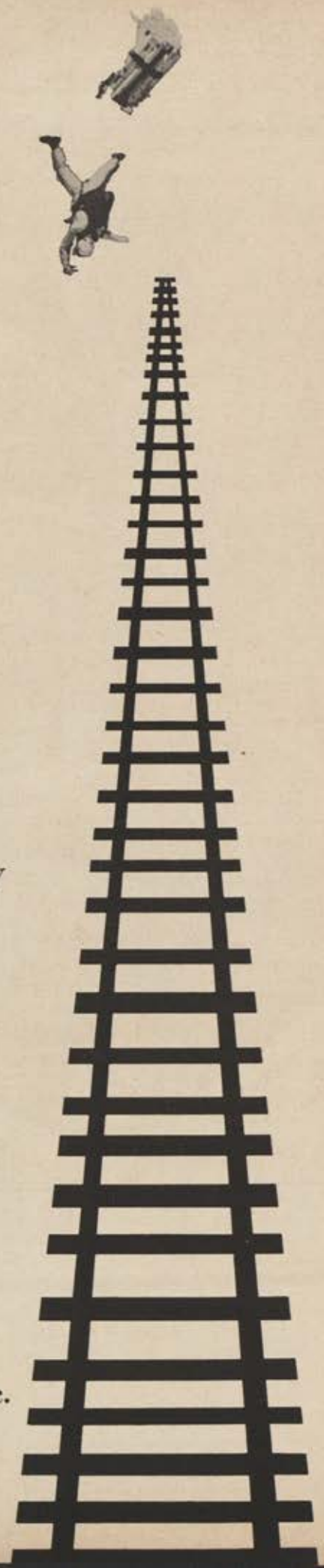
While the law protects the agency against dominance by military influences, it may be significant that there is no protection against domination from other quarters. For example, in the *Congressional Record* of August 11, on page 15,499, you will find a two-column "Dear Mike" letter to the sponsor of the bill, Sen. A. S. Mike Monroney (D.-Okla.). The letter is written by a spokesman for the so-called general aviation interests who laments what he calls a failure to "build into the government agency a pipeline between general aviation and the FAA." Somehow it strikes us that this complaint represents the approach of the I-Am-Bigger-Than-You-Are cult, like the farm lobby, and means that because there are more wings on general aviation than any other segment, general aviation needs special consideration.

This we dispute, and vehemently.

We submit that there are Little Things that are more important to the welfare of this nation than Big Things, and from the standpoint of aircraft USAF may be one of them.

If we were writing a law, and we hope nobody asks us to write one, we would make sure that the airlines, the military, and the private airplane owners knew what was going on and had a chance to voice their opinions before a just court. When FAA makes decisions they must be in the national interest. This makes military, particularly USAF, representation the one that merits priority.

—CLAUDE WITZE



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Track testing is a new and useful tool for evaluating—prior to flight—the reliability of the essential components that go into our missile and weapons systems. Today, at Project SMART, with rocket sled vehicles, the mission is to simulate the actual conditions of supersonic flight, and to study the effect of emergency bail-outs on both men and equipment.

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SHOOTING THE BREEZE

WITH THE EDITORS OF AIR FORCE MAGAZINE

Drawn into the loud controversy over the cost of the new Air Force Academy *(see pages 26 and 75)* was Milt Caniff, creator of the popular "Steve Canyon" comic strip.

Caniff, in recent weeks, has been using the new Academy site as locale for his strip. A Mississippi congressman, Rep. Jamie L. Whitten, denounced the Air Force (and Caniff by inference) for using the Canyon strip as "high-priced propaganda."

Interviewed, artist Caniff said that he had visited the new Academy site back in June to get the "feel" of the institution. That was several weeks before the congressional committee began sniping at what it called extravagant costs.

On Congressman Whitten's criticism, Caniff told a Denver newspaper:

"Mr. Whitten's attention is very flattering. As far as my being a high-priced propagandist, my fee for speaking well of the Academy comes to exactly the same sum as Mr. Whitten's speaking well of 'Steve Canyon.'

"Nobody," added Caniff, "ever told me what to say or what not to say. The Air Force answered my questions but never once tried to editorialize either out there or in Washington."

Caniff went on to say:

"It occurs to me, seriously, that whatever the Academy is costing under present-day prices is approximately comparable to the cost of the first building at West Point. That was $68,000.

"But out of that and subsequent buildings came enough leadership to get this country through six or seven major wars.

"I think the price being paid for the Academy is probably a small amount to invest in the kind of air leadership that may one day prevent all of us from being blown off the map."

The artist added that he had first become interested in the Academy some two years ago during a visit to Colorado. He had thought then of someday doing a sequence of drawings on it.

USAF Photo by T/Sgt. Leonard Hayes

Food for thought is the beauty of Miss Marcia Corley, who helped celebrate this year's award of the Hennessy Trophy, given annually for the outstanding food-service program in the USAF. This year's winning unit was the 6000th Food Service Squadron, Fuchu, Japan. Here Miss Corley, no mean morsel herself, beams as the trophy is accepted by M/Sgt. Elba C. Carter, top unit's food-service supervisor.

☆

While updating his biographical sketch, we had occasion to chat pleasantly with David West, author of the moving memory, "Waiting for the B-17s" *(see page 84)*, and found the English-born writer happily ensconced in Centralia, Wash., where he's busy freelancing articles and stories on subjects ranging from airplanes to antiques for a number of magazines. Mr. West is also serving as overseas editor for the respected British aviation magazine *Aeronautics*.

☆

Every once in a while, on a job like this, you trip over some Eternal Truth. We had a good example in preparing the fifty-year chronology for last month's issue of AIR FORCE *(page 194, Aug. '58)*. The question arose: What kind of an airplane did Jimmy Doolittle use when he made the "first blind flight" in 1929? First thing we knew, it didn't matter very much because our wry friend, C. B. Allen, one of our mentors in aviation reporting, threw out another question: Was Doolittle's the first blind flight?

C. B. acknowledged that he covered the story of Jimmy's accomplishment for the then-great New York *World* and, yes, he also called it the first blind flight. Nearly a decade later he read Igor Sikorsky's autobiography, *The Story of the Winged-S*. The book told of an incident in 1914, involving Sikorsky's "Ilia Mourometz" aircraft. It had four engines, two of 140 hp. and two of 125. The plane had room for a dozen passengers, lots of struts and wires, and a couple of "outside balconies" where the casual tourist could stroll in the sunlight. The place, of course, was Russia.

"We were slightly over 1,500 feet high when the city of Scklov was passed," Sikorsky wrote of one long-distance trip. "Flying almost directly southward and gradually gaining altitude, we soon found ourselves in the clouds. It

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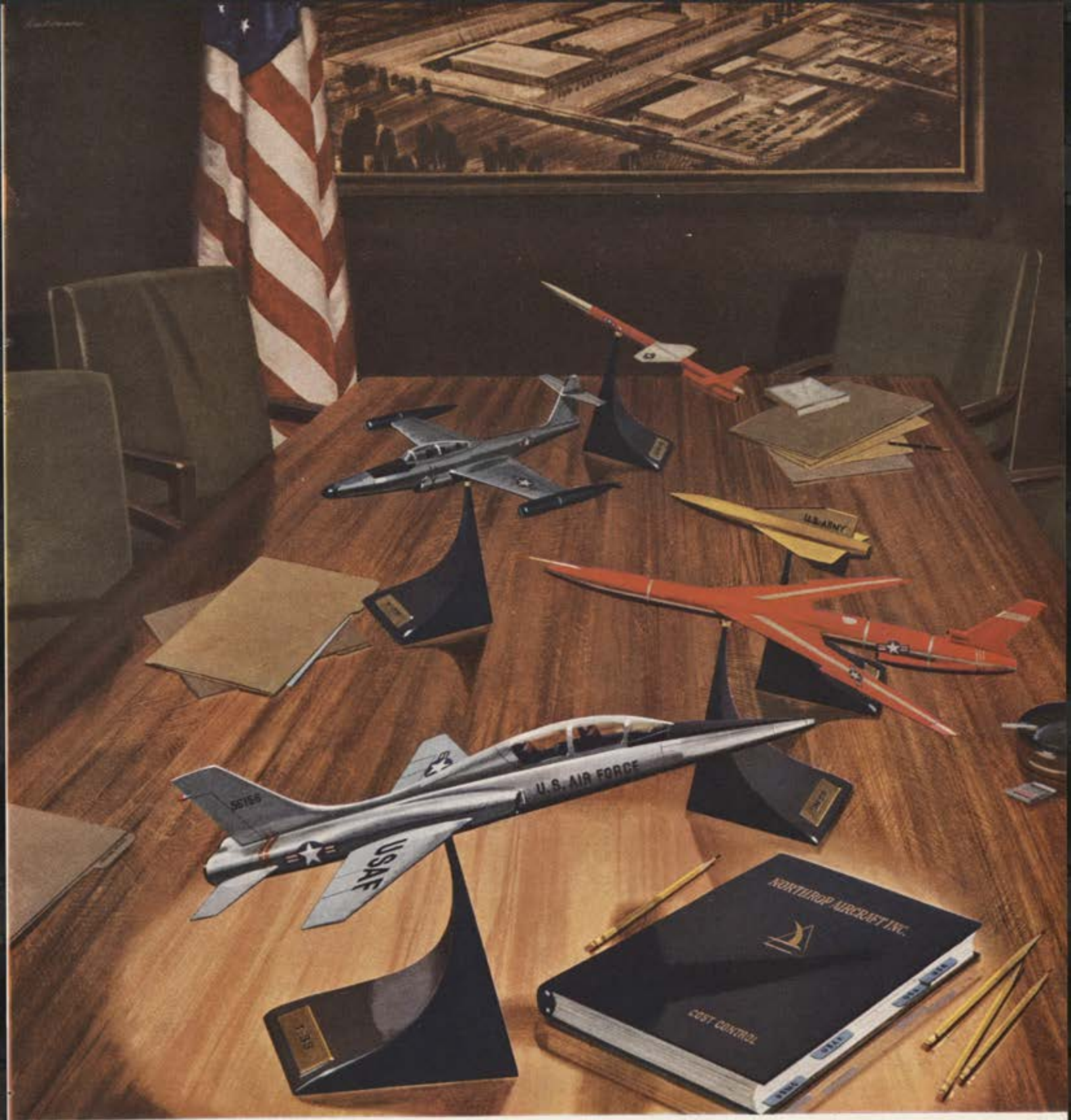

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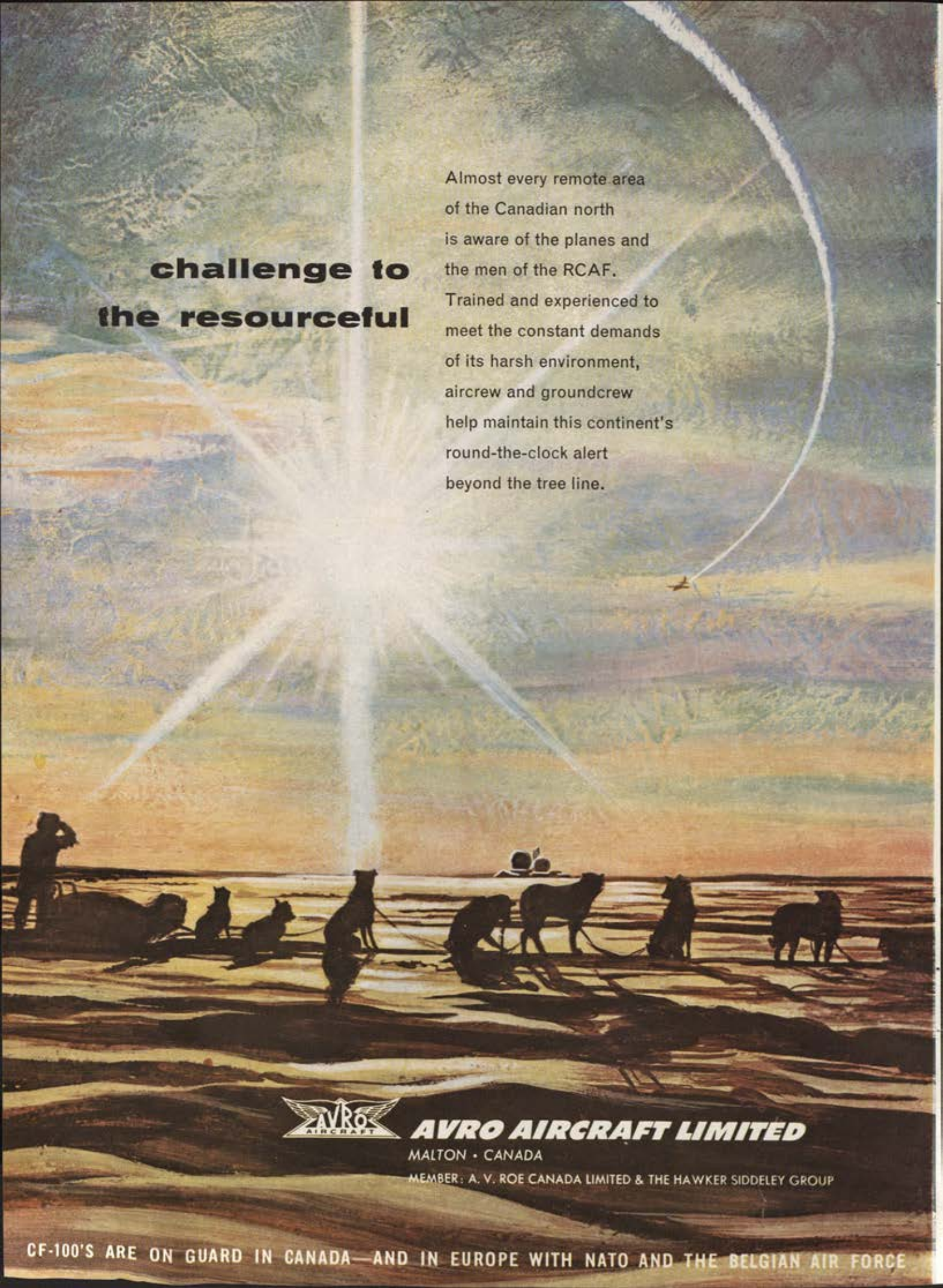
challenge to
the resourceful
Almost every remote area
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Trained and experienced to
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CF-100'S ARE ON GUARD IN CANADA—AND IN EUROPE WITH NATO AND THE BELGIAN AIR FORCE

Lighter than Air

An Air Force "Ice Cream Wagon" is the radio-equipped vehicle normally parked near the landing end of a runway. From it an observer can advise landing aircraft of conditions that might cause an accident. At Keflavik, Iceland, one of these Good Humor Men, watching an approaching Super Sabre, saw that the F-100's wheels were still up and immediately warned the incoming pilot. Apparently preoccupied, the Super Sabre jockey didn't hear the message. A second warning about the gear-up landing also went unheeded. Finally the Good Humor Man shouted, "You can land all right, knucklehead, but you'll have one helluva time taxiing." It saved a Super Sabre.

DAVID F. MCCALLISTER
Swarthmore, Pa.

This chuckle-and-snort corner is devoted to true, unpublished anecdotes about Air Force life. Send us yours. We'll pay $5 for each one published. All we use become the property of AIR FORCE Magazine. We can't acknowledge receipt of anecdotes and none can be returned.

grew darker. . . . Even flying blind in the clouds was not difficult. . . . About 6:30 we were still flying blind in a very strong rain and rough air. . . . Tired by the rough, blind flying, we did not realize at once what was going on. . . . The ship had gone into a spin . . . came out . . . and we could not see 100 feet ahead."

The instruments were crude. There was a ball bearing rolling back and forth in a curved glass tube. Sikorsky later told C. B. Allen there also was a weight on a string, a simple plumb line where the pilot could keep an eye on it.

In case you're wondering, Jimmy Doolittle's plane, a Consolidated NY-2, had real instruments, designed by Sperry, and his flight was a milestone in aviation history. But be careful with those Eternal Truths. You can trip over them.

☆

Now that Texas is the second largest state in the Union, cartoonist Jack Tippit, whose work has been brightening the pages of AIR FORCE for some five years, now is decamping to one of the smallest of the forty-nine—Connecticut. Jack, whose cartoons appear regularly in *Look*, *The Saturday Evening Post*, and other national magazines in addition to AIR FORCE, stopped by for his first visit to our Washington editorial offices en route.

☆

Flying mice are nothing new, and Air Force rides for mice in nose cones to test biological responses and endurance brought to light this venerable story as related in the *Air Service News Letter* (from which this magazine is a direct descendant), for November 18, 1921:

"How a mouse took a ride in an airplane is being discussed over in Plainfield, N.J., where Harris W. C. Browne who has a D.H. 6 which he keeps in a hangar on Greenbrook Road, took his ship out one morning and when up about 2,000 feet was surprised to see a field mouse running along the back of the front cockpit. The little fellow did not seem to be scared at all, and after looking around for a moment sprang down into the cockpit and disappeared from the view of the pilot. When the plane was landed it was discovered that the mouse had gnawed a hole in the seat cushion, taken out some hair, and built a nest in a corner under the life belt. The aeronautic mouse was allowed to escape and is probably the only mouse in existence that ever went up in a plane and lived to tell the tale. The question is, what would Ruth Law have done if she had been the pilot?"

☆

Regarding the Air Force's ill-fated August moon shot, we were asked if we know who had the Teahouse concession.

☆

Space, it's wonderful! One of the byproducts of the current and increasing interest in things astronautical is a new brand of cigarettes (which we haven't seen yet on the stands on our block) being made in Philadelphia.

Brand name: Space (with "Vaporlight" filter).

Slogan: "They're out of this world."

☆

From the Washington *Post and Times Herald* a report that vicuna is not the only fur-bearing animal giving the Administration trouble. An irate Washington state lady has written the President that baby mink and their mothers are allergic to roaring airplanes, and would the President consider changing the date of Armed Forces Day?

Wrote the lady: "I know of two ranchers . . . who definitely lost large amounts of kits due to the planes roaring overhead. . . . Now, Mr. President, having given much thought to this, I would like to offer a suggestion, if I may. . . . Couldn't we change our [Armed Forces] Day to the last part of June or July? I think this might eliminate a lot of lawsuits against the government that we might have had. We would be way past the whelping season and have most of the mother mink away from their kits, thereby avoiding most of our current dangers. . . . We hope you will give this your consideration. . . ."—END

It's Tops

"Down Under"

Allison Prop-Jet-Powered Lockheed Electras ordered by all 4 Airlines in Australia and New Zealand

Everything is big "down under," including the growth rate of the national economies. And all four airlines in Australia and New Zealand – Ansett/ANA, TAA, Qantas and TEAL – are staying in the forefront of national progress. They've *all* ordered Allison Prop-Jet-powered Lockheed Electras equipped with Aeroproducts propellers, the fastest, most modern, most efficient prop-jet-powered airliners ever flown.

These new airliners will carry passengers from city to city, coast to coast, country to country faster, smoother, more comfortably than ever before. And that means a lot of things will get done a lot faster – a specialty in Australia-New Zealand.

The unanimous acceptance of Allison Prop-Jets "down under" brings to 14 the number of domestic and international airlines which have ordered Allison Prop-Jet-powered Lockheed Electras. And the Royal Australian Air Force has also ordered 12 Allison Prop-Jet-powered Lockheed C-130A Hercules transports.

ALLISON DIVISION OF GENERAL MOTORS, Indianapolis 6, Indiana

GM GENERAL MOTORS AIRCRAFT POWER

ALLISON PROP-JET POWER

AIR FORCE
SEPTEMBER 1958

THE MIX-UP IN AIR DEFENSE

By Claude Witze
SENIOR EDITOR

WASHINGTON, D. C.

THE entire machinery for our air defense system is so complex," a knowledgeable Pentagon official said recently, "that the American public doesn't understand it and probably never will.

"If they did, this program easily could be the biggest scandal in American history."

Scandal is undoubtedly much too harsh a word to be applied to the air defense situation. But one thing is sure, it is a crazy, mixed-up mess at the moment. If the "mess" can be corrected—and nobody is sure it can be—the first opportunity will come with implementation of the Defense Department reorganization bill, signed by President Eisenhower in early August. There are strong indications that air defense is the most important single headache the White House hoped to cure when it proposed, in this legislation, the use of unified commands directly responsible to the Joint Chiefs of Staff and the Secretary of Defense.

Details of how this will be done are not clear at this writing. Gen. Earle E. Partridge, head of the North American Air Defense Command (NORAD), has submitted recommendations to the Joint Chiefs. He has asked for full and unequivocal authority over all three US services

(Continued on following page)

Fastest fighter-interceptor in USAF inventory is Lockheed F-104A Starfighter. It holds speed record of 1,404 mph.

in their contributions to the air defense mission. But what he gets will not be granted to him as NORAD commander, because NORAD includes a Canadian element, the RCAF Air Defence Command. General Partridge's new responsibilities, whatever they are determined to be, will be worn under his purely US hat as Commander of the Continental Air Defense Command (CONAD). The Air Force has been the executive agency for CONAD, which includes the US Army Air Defense Command (ARADCOM) and US Naval Forces, NORAD (NAVFORNORAD) in addition to USAF's own Air Defense Command (ADC).

This obviously complicated command setup more or less epitomizes NORAD's air defense dilemma and its current helplessness in the face of growing rivalry for the air defense mission. The trouble is that there are conflicting philosophies at large within NORAD, and General Partridge has not held the power to resolve them. As CONAD boss he has "operational control" over the US elements of his command but nothing to say about *how* the contributions from the various services are put together.

Meanwhile, strong partisans in both camps, Army and Air Force, working with contradictory concepts of how best to defend the country from enemy air attack, are ready to fight desperately for full control of the air defense mission, while outwardly taking on the appearance of a full-fledged joint command. It is this sort of rivalry that the new reorganization bill is designed to cure.

Two years ago the Air Force Association declared that lack of true unification in the existing defense structure "too often ties military careers, and therefore military operations, to obsolescent weapons and concepts. The system encourages the postponement of basic decisions by piling compromise on compromise, committee on committee. It includes jurisdictional disputes harmful to national security. It is wasteful of time, money, and manpower."

All of these evils have come home to roost in the air defense mess, which might be more accurately described as "CONAD's dilemma."

Basically, the internal CONAD argument is over conflicting air defense philosophies with the wrangle over weapons following in its trail. The Air Force holds that air defense cannot be separated from air offense, that they must be integral parts of a whole. The first priority, USAF says, is the ability to win a global war, and air defense must contribute its share to this ability. It must contribute to our deterrent power, protect our ability to carry out a retaliatory air offensive, and limit enemy damage to the US. The major threat, naturally from Russia, will come over the next decade. During this period there will be an increase in Red ballistic missile capability, accompanied by vastly improved manned bombers, viciously armed with air-to-surface missiles, electronic countermeasures (ECM), radar-absorption devices, and decoys. Both high- and low-level attacks are possible, at supersonic speeds over target.

This is a good time to emphasize the potential of the manned bomber, which holds tremendous advantages over a ballistic missile in the accuracy with which it can carry out a mission, the high yield it gets from its weapons, and its flexibility. It can find targets of uncertain location, pick alternate targets, carry out more than one attack, and may be recalled if need be without dropping its bombs. It can

Believe it or Not!

US Army's aggressive progress in the development and employment of surface-to-air (SAM) missiles has resulted in a type of confidence not found in any other branch of the armed forces. About a year ago the following memorandum was circulated to the Command and Staff Department, US Army Air Defense School, Fort Bliss, Tex.:

"1. Effective immediately, all instructors will avoid the use of the statement, 'air defense problem.'

"2. There is no problem with SAMs. The problem is solved; we need only to execute the prearranged plan for the destruction of the enemy threat.

"3. Suggested statements that may be used are: 'in the field of air defense,' 'air defense considerations,' 'in air defense employment.'

"4. POIs and schedules will be corrected accordingly."

HARRY J. HUBBARD, Col. Arty.
Director

be a decisive instrument of air war if the defense against it is allowed to lag in the belief that missiles are all we need worry about.

The interdependence of air defense weapons and the Strategic Air Command's offensive power is evident throughout USAF's program. The actual running of an air war, the effective use of air space, proper deployment to provide protection for SAC bases, the economics of paying for interceptors and bombers, the technological problems—all these demand close interrelating of the two air war systems. This is basic to the Air Force argument.

USAF's planned use of air defense weapons is centered in the area-defense concept. Area defense has been defined as "the concept of locating defense units to intercept enemy attacks remote from and without reference to individual vital installations, industrial complexes, or population centers." An information-gathering, traffic-control, and weapons selection network such as the SAGE (Semi-Automatic Ground Environment) system is required for area defense. Area-defense weapons, which are long-range interceptors and missiles such as Bomarc, do not depend for their guidance information on acquisition and tracking radar near the launching site.

The distinguishing thing about point-defense missiles is that they must get their guidance from nearby radars. Three of these are necessary for each launching point, and they are limited in their coverage by line of sight. The point-defense missile system, of course, is the Army Nike. Expansion of the program was limited by a Defense Department order in 1956 to sites recommended by CONAD to the Joint Chiefs of Staff.

The area-defense mission assigned to USAF dovetails properly with that service's planned use of manned interceptors and the long-range unmanned interceptors of the Bomarc type. Such an area-defense system can use any radar, no matter how far from the launching site, so long as the information can be processed by SAGE. This permits combination of the USAF air defense mission with a complete air raid warning system, and an air space control program. One of the basic precepts of this approach is "defense in depth," the principle of killing the enemy as far away from the target as possible. It makes the kill before the attacker reaches a point where he can release a bomb or air-to-surface missile. It ensures minimum fallout damage from nuclear explosions, gives more time to cope with ECM and decoys. It "keeps the battle out of the back yard."

The first operational Bomarcs will be ready late this year. They will have a range of about 200 miles. A follow-on version, which should appear about eighteen months later, will have a range of about 400 miles.

Second major weapon in the USAF program is the long-range interceptor. Now under development is the North American F-108, a Mach 3 design that will meet enemy bombers at least 1,000 miles from US soil, beyond the reach of the SAGE system of control. SAGE will control use of the Bomarc and the regular air traffic that is expected to clutter the area as medium-range manned interceptors and bombers take off on their missions.

The air-to-surface missile, such as the Air Force's Rascal and the Hound Dog, now under development for the Boeing B-52 jet bomber, is a major menace to any point-defense system. By the time the Army has operational Nike-Hercules batteries, the Russians are almost certain to have an air-to-surface capability that will outrange the Hercules. Nike is inherently a short-range weapon—the Hercules will reach a maximum of 100 miles but is more likely to cover about eighty-five—and has no low-level capability. For this

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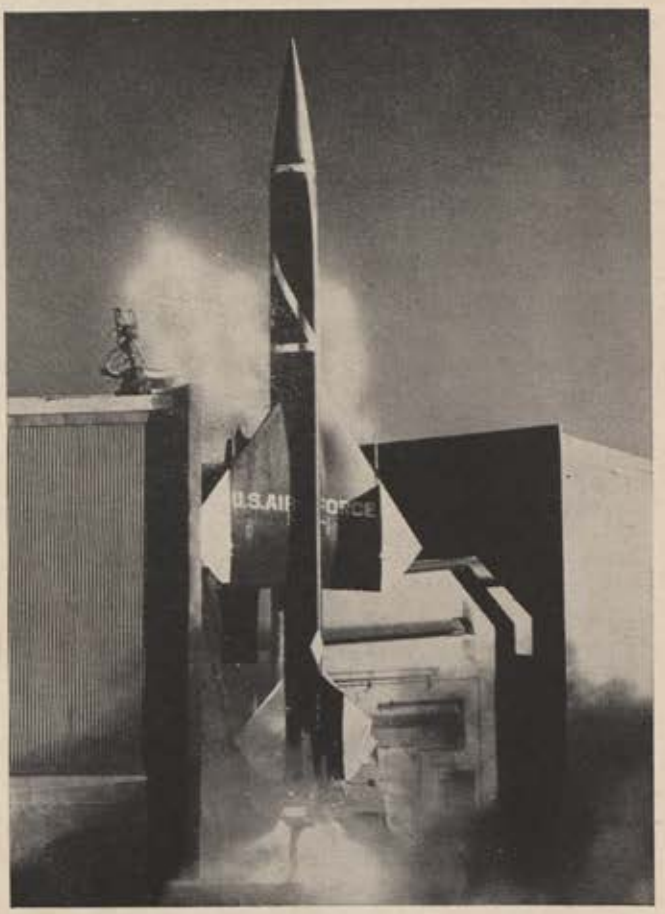
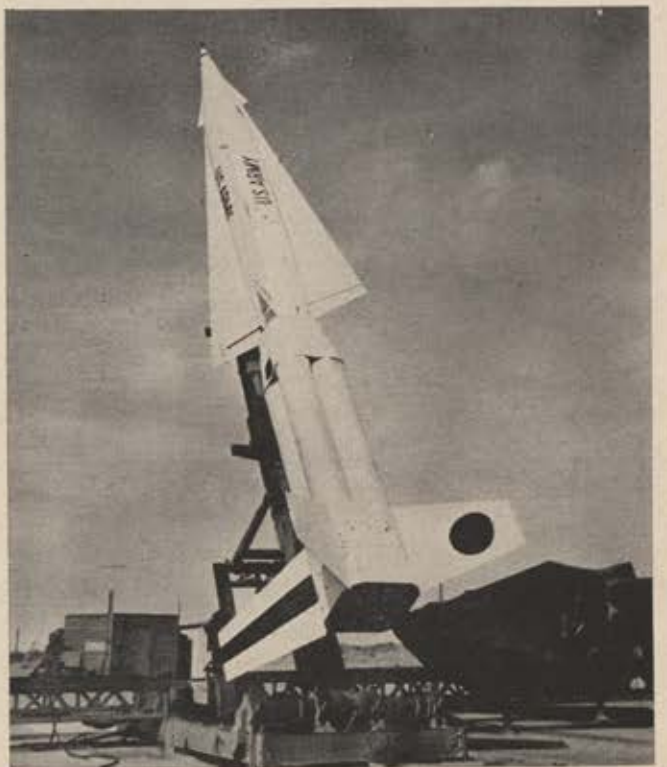


Boeing Bomarc is first SAGE-controlled interceptor missile, carries own radar to find its target 200-400 miles away.



Army's Nike-Hercules is point-defense weapon with short range. Each battery has own radars that must find target.

reason, Army plans call for a supplemental effort by the Hawk, designed to take care of this gap, but again not hitting an incoming attacker until he is almost to the target.

The conflict in concepts, leading to rival short- and long-range weapons, has fertilized maverick air defense approaches in the US Army. An outstanding example is the announced policy of "Detect, Attack, Destroy"—translated on the cover of an Army brochure to mean "Ack, Track, Smack." More impolitely, it is called in Air Force circles the doctrine of "Shoot 'em down first and sort 'em out on the ground."

At the Army's Air Defense School, Fort Bliss, Tex., soldiers who will shoot point-defense weapons such as the Nike-Hercules and Hawk are taught that it is no concern of the Army's whether the target is hostile or friendly. In other words, it is the job of the Air Force to make sure that individual fire units, autonomously carrying out the point-defense role assigned to the Army, know which targets are friendly and which are enemy weapons.

The "ideal" situation, the Army says, is one where no friendly aircraft are within range of its weapons. If they are found there, they will be shot down. Ultimately, Army says, manned aircraft will be phased out, and until that time Army defense units are "Weapons Free," which means that they are not subject to any form of centralized control. The individual fire unit commander must select the targets, the Army says, dismissing all electronic centralized control systems as complex, cumbersome, vulnerable, and unreliable.

The Army school now teaches that "identification" and "interception" are words that must no longer be used in describing the elements of air defense. They are deleted from the vocabulary. There is a definite assertion that each missile battery is an autonomous unit and will shoot when it is ready and at any target it can reach.

USAF is replacing manual control with SAGE system computer. It will assign weapon to make kill far from target.

This doctrine is a terrifying thing to the Air Force. It means that the Army is determined to clear the skies, and it is up to the interceptor or bomber pilot to make sure each individual Army battery commander knows he is not hostile. The Army school has disowned identification as any part of the Army air defense mission and has claimed exclusive jurisdiction over use of the air space within range of its weapons. If the doctrine is carried to its logical conclusion, conceivably neither SAC nor ADC would be able to carry out its mission.

General White's Testimony on Air Defense

By 1961, it has been estimated, the nation's investment in air defense will run to $33 billion in hardware. The investment will be no good, a lemon on the market, if it is not properly interrelated with an even bigger investment in the Strategic Air Command. SAC, as everyone knows, will be America's, and the free world's, offensive force from now on, into and including the space age. The situation was made clear on June 18 by USAF Chief of Staff Gen. Thomas D. White, in the following testimony before a Senate Appropriations Committee:

In discussing offensive and defensive capabilities, I would like to point out the need for extremely close coordination between the air offensive and the air defensive. [They] are closely allied to each other. They are not independent, but interdependent.

In case of surprise attack . . . our strategic forces must be alerted and launched at the same time as our defense forces are going into action. They cannot be permitted to interfere with each other's operations. This requires extremely close direction and control to assure protection of our offensive and defensive forces and the most effective destruction of enemy forces.

In developing our air offensive and air defensive, we must also have close coordination in our training and in the development of combat techniques.

Our offensive forces will then know what to expect of a good defense. Likewise, our defensive forces will know what can be expected from a good offense. Such coordination in the development of techniques will improve both our offense and our defense.

There are other factors . . . in which the Air Force has long experience. . . . This includes air combat experience in three wars, our global communications network, and our capabilities in electronic countermeasures.

The Air Force has always tried to develop its capabilities in accordance with its assigned responsibilities. Air Force capabilities are now being projected into the future on the same basis . . . [USAF] embarked on the intermediate- and long-range missile programs because these missiles offered certain advantages over manned jet bomber systems. However . . . there is no question in my mind that the high-performance jet aircraft of today . . . will bear the brunt of our missions for the immediate future. . . .

Our studies indicate . . . that even with vastly improved missiles, our strongest force structure—the one providing the best survival insurance—will be the one in which missiles and high-performance manned systems are used together in complementary roles and in mutually supporting roles.

I say this in the belief that missiles are but one step in the evolution from manned high-performance aircraft to manned spacecraft. In the force structure of the future I feel sure that we will need both piloted and unpiloted systems.

SAGE's Digital Data Transmitter sends accurate intercept information over long distances to USAF weapon sites.

The inclusion of this doctrine in the Army curriculum is not approved by NORAD or even by the Army's own Air Defense Command headquarters at Colorado Springs. Yet both General Partridge and the Army's Lt. Gen. Charles E. Hart, ARADCOM commander, are helpless to stop it. The line of command over Army elements is such that old-line Army officers can draw up and promulgate policies contrary to the intent of both ARADCOM and NORAD.

Return for a moment to the Army school's deletion of the word "interception" from the air defense vocabulary. This is an attack on the basic philosophy of the Air Force approach to air defense as well as an attack on the proven USAF capability in detection and design of a computer to solve the intercept problem. USAF considers computers an essential ingredient. That is why it designed the SAGE system to handle the mass of detail that must be available to conduct an orderly air battle. In a modern high-speed air defense machine, SAGE is indispensable.

Yet, outside of the joint command of NORAD, most Army officers reject the SAGE concept. They teach a doctrine based on an air battle with no such thing as interception in the USAF sense, and they have been known to design components deliberately incompatible with the SAGE system. Even in NORAD it is generally accepted that the Army has no capability in this area and would make a fiasco out of air defense if left to pursue the project without a SAGE to ensure proper air space control. And this means that Army officers, as well as those in the light blue of USAF, accept the virtues of the SAGE system from the vantage of the joint command. They are helpless to halt Army promotion of the decentralized fire control system, with each battery its own judge of when and what to shoot. This will continue until NORAD is truly unified and all of its components are forced to accept decisions made with the authority of the Joint Chiefs of Staff and the Secretary of Defense.

In the USAF's Air Defense Command, Lt. Gen. Joseph H. Atkinson, its boss, does not share the problems of his Army counterpart, General Hart, in obtaining full and technically correct cooperation from all the USAF components that contribute to his organization. The Air Force has given him the right to demand and get whatever he wants from units such as the Air Training Command, which is USAF's counterpart to the recalcitrant Army Air Defense School.

ADC and CONAD have this much in common: Both are critical of their common USAF headquarters. There is a strong feeling that the air defense mission has suffered in the support of SAC as our first-priority deterrent force.

Many CONAD and ADC officers are concerned over the changing character of the force structure. Based on plans to acquire Bomarcs and circle the United States with launching sites, there will be a cut in the number of wings of manned interceptors. Because the F-108 will have long range, backed up by medium-range aircraft now coming to the inventory, Headquarters USAF feels the area-defense mission can be carried out with fewer weapons. On the other hand, at Colorado Springs there is evidence that the Army program will push the Nike-Hercules/Hawk combination to literally hundreds of batteries. Some USAF officers feel their own service has, to some extent, forfeited its prerogatives. They argue further that the Army is grabbing opportunities at every turn until it may be too late for a change, both politically and technologically.

Despite the size of the Army camel in the tent it remains clear that USAF cannot in conscience afford to abandon its control over the air defense mission. It is, as pointed out, too closely intertwined with the SAC mission. If logic prevails, CONAD must accept the USAF concept of hitting the enemy as far away as possible. The choice, then, is obvious. The nation must finance expansion of the Bomarc and manned interceptor programs.

Further, CONAD must have a voice, a real command role. It must help make up the composition of its own forces. It must stop the *laissez faire* approach of letting Army buy all the Nikes and Hawks it can get out of Congress and letting USAF struggle for funds to pay for Bomarcs and SAGE and interceptors.

The reorganization bill can make these things possible. NORAD, or the CONAD lion's share of it, must face this challenge, or dilemma, with courage. The political obstacle to wiping out any part of Army's capability was recognized in debate on the reorganization bill, but at no point in the argument were the basic errors of the point-defense concept pointed out. At the moment, the decision appears to be wholly on the desk of Defense Secretary Neil H. McElroy, who has been subjected to a stepped-up anti-Bomarc campaign since early last summer. The first thing Mr. McElroy must buy, before he buys a weapon, is the fundamental soundness of the USAF area-defense concept.

Once that is done, General Partridge must be given full command and a strong voice over how his components are developed, purchased, operated, and maintained. So far as proper integration of those components is concerned, the new Air Defense Systems Integration Division with headquarters at Hanscom AFB, Mass., is shouldering the responsibility. It includes representatives of the Air Research and Development Command, the Air Materiel Command, and the Air Defense Command. A new corporation, formed with the assistance of the Massachusetts Institute of Technology, will take over management aspects of the program. Called Mitre Corp., it boasts a board of directors drawn from top US business firms not involved in defense weapon system contracting. Until Mitre is fully operative, engineering service will be provided for ADSID by MIT's Lincoln Laboratory, birthplace of the SAGE system.

That the Defense Department reorganization bill and the shift of orders to a channel from the President to the Secretary of Defense to the Joint Chiefs to the unified command will solve all these problems is highly improbable. But certainly a truly unified command for the air defense mission will be a big step in the right direction.—END

General Chennault, as he appeared during the grim days of World War II.

Talking it over with some of the boys. General Chennault stops to chat with men of his Fourteenth Air Force in a rare "time out."

Lt. Gen. Claire L. Chennault

1890—1958

MANY miles apart, the one in a quiet, saddened hospital room in New Orleans, and the other in the sun-washed air over the Mojave Desert a few minutes out of Edwards AFB, Calif., two important lives came to tragic ends during the weekend of July 26.

In New Orleans, only a few days after he had been promoted to lieutenant general, Claire L. Chennault, the leathery leader of the legendary American Volunteer Group of Flying Tigers who held the Japanese Air Force at bay in Burma and China during the dark early days of World War II, died of lung cancer at the age of sixty-seven.

Anyone who knew General Chennault understood that only such an unseen enemy could down that kind of man. In his event-packed life, he had beaten everything else—the enemy in war, the criticisms of officialdom, every sling and arrow.

During World War II, the General and the Generalissimo, China's Chiang Kai-shek, meet at air headquarters.

Ruggedly handsome, Captain Kincheloe was crack test pilot, Korean War ace.

Capt. Iven C. Kincheloe, Jr.

1928—1958

Captain Kincheloe with the famous Bell X-2 in which he achieved world's manned-flight altitude record of 126,200 feet in 1956.

The same weekend, near Edwards AFB, where for months he had been preparing himself for the supreme and significant adventure of being America's first man into space as pilot of the North American X-15 aerospacecraft, Capt. Iven C. Kincheloe, Jr., USAF, met death in the crash of an F-104 Starfighter jet. Minutes before he had taken off to fly chase for another pilot on a test flight.

Captain Kincheloe had turned thirty on July 2. In his brief span he had become a jet ace in the Korean War (eleven victories over Communist MIG-15s), the holder of the world's manned-flight altitude record (126,200 feet in the Bell X-2), and a highly qualified aeronautical engineer —a living symbol of the Air Force's advance in flight.

Apart in era, unlike in personality, these airmen, together in death, share the greatest coin—courage, the proven stuff of heroism.—END

At AFA Jet Age Conference in February, Kincheloe chatted with USAF space doctor Hubertus Strughold.

One approach to edge-of-space feeding. Through opening in facepiece of pressure suit, USAF pilot intakes liquid food from this gravity-feed container.

EATING

". . . A Jug of Wine, a Loaf of Bread—and Thou"
—The Rubaiyat of Omar Khayyam

ALTHOUGH such a diet might satisfy the nutritional needs of earthly lovers, the Persian poet's famous menu would scarcely keep mind and marrow together for tomorrow's spacemen. We are on the edge of space, and when we get there we will take with us the prosaic human need to eat. And voracious man annually needs something like two tons of food, water, and oxygen to survive.

Nutrition in space—the provision of palatable meals in a hazardous and unearthly environment—is one of the most ticklish of astronautical problems, and aeromedical thinkers are already hard at work on approaches to this difficult question. The problem must be solved before extended manned spaceflight can become a reality.

On our planet, nutrition is a relatively simple matter. Man, like all living creatures, consumes food suitable to his physiological and psychological needs. From this food his system takes substances that are converted into the energy needed for survival, growth, and function, and expels through excretory processes waste material which in a very long and involved cycle contributes to the formation of additional plant and animal food to be again consumed by some living being.

What is used is used over and over again. Scientists call this an ecological cycle. Matter goes through change after change and allows for the variety of food substances that grace our Sunday roast beef dinner with all the fixings. This system supports life in an efficient manner and has been even further improved—as man has come to understand such chemical phenomena as vitamins with which he supplements natural food. This chemical cycle gives us the very air we breathe. We live, in effect, on a gigantic spaceship, which receives its energy from the sun. Plants absorb the sunlight and through the process of photosynthesis give off the oxygen that is exchanged for the carbon dioxide exhaled by man and animals. This exchange creates the needed balance of gases in our atmosphere. It is a benign circle. The air we breathe will be breathed again. The dinner we eat tonight may delight someone else in the future—in another form.

All of this fantastic process occurs under most favorable conditions. The earth is large, and the cycle of exchange of matter is long enough to provide pleasant variety in the food supply, and—thanks to gravity—the food we eat stays squarely on the table.

The natural ease of this process cannot occur on a spaceship. A spaceship is an artificial world in miniature. And because it is artificial and in miniature, there is neither time nor room for the long, natural cycle of reutilization of air, water, and food that benefits all life on earth. When we go into space, depending on the length of our trip, we will have to, as we do on long ocean or airplane voyages, either "take our lunch" along with us to suffice for the trip or else *create artificially* a system approximating the earthly exchange cycle to provide the

By William Leavitt
ASSOCIATE EDITOR

Flying higher and higher

man still needs to eat . . .

Today's Air Force research

is looking for the answers

to high-altitude and space feeding

that's out of this world

necessary air, food, and water by reutilizing our original supplies. In the early stages of manned spaceflight, we may well use a combination of these two methods, "taking our lunch" along so far as food needs are concerned, but recycling oxygen to extend our supplies of the vital gas.

A further and very important problem in feeding spacecrews is the bogey of weightlessness. Unless scientists can devise a reliable system of artificial gravity, eating in the earthly manner will be out of the question. Fluids will float out of conventional containers and ball up in the air of the sealed spacecabin; solids will not stay on the plate because there will be no gravitational force to keep them there. Cooking in the conventional manner will be impossible. If you lifted the lid on a pot of stew, the contents would be propelled messily into the air by the steam. And imagine trying to eat peas in a zero-gravity condition. The unanchored eater might find himself floating about the spacecabin stabbing vainly at airborne peas.

This mechanical problem will exist in spaceflight no matter what approach is taken to the *stuff* of our food supply. We might avoid the zero-gravity problem with the super-concentrated aspirin-sized tablets science-fiction writers so often use to feed their spacecrews. Unfortunately, the meal-in-a-tablet method—even if it could be accomplished—ignores the *psychological* needs of spacemen, to whom meals will be as important, if not more so, than they are to the earthbound. And it assumes, too, that the human body can subsist without bulk and hence pretty much without elimination, which is a moot medical question. On that point, it seems reasonable that if spacecrews living on super-food pills skipped the usual elimination processes during flight, their intestinal mechanisms would be in unhappy conditions of disuse when they got back to earth.

The Air Force has already done some revealing research into the question of eating in the weightless state—in jets flying parabolic patterns which produce the gravity-free condition for a matter of seconds. Subjects have discovered that it is necessary—at least in the case of water—to force the fluid with the tongue to the back of the mouth, after which the muscles take over. The same would be true of solid food. It's generally believed that in zero gravity the muscles can be relied on to carry out the usual digestive processes. But there is some question about the actions of the digestive juices themselves. To meet that problem, some researchers have suggested the inclusion of defoaming chemical agents in the food. Most of these mechanical questions, like so many other questions of manned spaceflight, will remain answered in theory only until the first manned voyages—in earth satellites and to the moon.

But to get back to the food itself, let's look at some provocative Air Force thinking on space nutrition. Lt. Col. Albert A. Taylor, Assistant Chief of the Biomedical Division of ARDC's Directorate of Life Sciences, asks:

". . . What will travel involving these distances mean with respect to food? In order to plan our trip we need to know how long it will take. . . . For the purposes of . . . food, we can probably best examine the problem if we divide space feeding into three classes based on the length of flight. First, there will be short periods of spaceflight lasting not more than two or three days [trips to the moon]. Second, there will be trips of intermediate duration [interplanetary flights to Mars or Venus], that is, those of more than two or three days and extending up to some indefinite time which we can call X months. Third, there may be very long duration flights. Here we need to think in terms of space voyages which may last for years, and possibly some in the more distant future, even for generations [trips to the stars].

". . . Obviously, the duration of flight will in large measure determine the kinds of foods which may be feasible. Each of these categories of flight involves specific problems. . . . The pure logistics of carrying sufficient supplies [of oxygen and food] for very long periods of time becomes critical in a vehicle that must escape the earth's gravitational field. . . . Weight conservation is a highly critical consideration for spaceflight. . . . Another of man's needs . . . is his requirement for water. An average man of light occupation needs about 2,200 milliliters of water a day [4.65 pints]. This includes the liquids he drinks and the water contained in his food. In terms of weight, this involves about five pounds per day . . . an amount approaching one ton per year . . . a serious limiting factor.

". . . When an individual eats all of his meals at home, approximately seven pounds of food is consumed each day from kitchen supplies. This includes the weight of inedible portions of food, food lost in the process of preparation, and materials in the process of preparation. . . . Obviously, even for short periods of spaceflight, food such as that used in the home would involve excessive weight, both from the standpoint of the food itself and the equipment . . . for its storage and preparation. For short spaceflight missions, we can use ready-to-eat foods, comparable to those now used in flight feeding. However, this type of food would be excessively heavy for longer periods of travel. [Hence storage space] is a . . . limitation."

Aside from gravity and content factors, the real problem then, is *weight*, and Colonel Taylor in the chart which

(Continued on following page)

LENGTH OF FLIGHT	LIMITING FACTORS	SOLUTIONS TO EXTEND LENGTH
Two to three days	Stored inflight foods Liquid oxygen supplies Stored water	Dehydrate and concentrate foods Regenerate oxygen from carbon dioxide Recover water from urine and the atmosphere
Three days to X months	Stored concentrated and dehydrated foods	Regenerate carbon and nitrogen compounds from waste matter
X months to infinity	None	

appears above illustrates the limiting factors and possible solutions.

It's interesting to note that on Colonel Taylor's chart there are *no* limitations in the X-to-infinity trip category. This is based on the assumption that by the time we are ready for such trips to the stars, we will, by necessity, have learned to recycle wastes into palatable food, approximating nature's earthly cycle—if for no other reason, possibly, than to cope with the problem of disposing of the tons of human waste that would, if simply ejected from the ship, continue to follow our spaceship through the void. Disposal, like feeding, is a considerable problem on a long space voyage, and it would be a problem in energy and payload to have to carry special equipment (rockets and containers) to force the waste into trajectories away from the spaceship.

The longer the trip, the greater the need for extreme objectivity among the spacecrews. Water reutilization is a case in point. Under serious Air Force study right now are methods of purifying urine for reuse in both washing and drinking. A fascinating paper on this subject was given by Air Force Capt. Willard R. Hawkins at the 1958 meeting in Washington of the Aero Medical Society. Captain Hawkins proposed several methods, including distillation, freezing (to obtain water crystals for further purification), and electro-osmosis, a complicated electrochemical process. Energy requirements to operate such systems might be considerable, but there is the possibility of avoiding that problem by using solar energy.

Theoretical knowledge of urine recycling is far in advance of the much more complicated process of recycling semisolid fecal waste. The most common proposal for accomplishing recycling of semisolid waste is through the use of algae. The waste would be fed to algae from which would be grown special strains usable as human food. Algae nourished by light have already, at the Air Force School of Aviation Medicine at Randolph AFB, Tex., proved to be capable of exchanging carbon dioxide for breathable oxygen to keep animal life alive. Will algae provide food for spacemen as well? Complicating the idea of using algae aboard spaceships is the fear in some scientific quarters that under the influences of cosmic radiation algae might mutate adversely.

Another approach to the problem of long-term space feeding has been proposed by Dr. Carl C. Clark of the US Naval Air Development Center at Johnsville, Pa. Dr. Clark's menu is depressing, but it should be listed because his strong suggestion is that aboard a long-voyage spaceship "any atom thrown out cannot be replaced, and the occupants must eventually have the capability, by the expenditure of energy, of converting waste molecules into

Under study is newest high-altitude feeding method, American Can Company-produced squeeze tubes, used as shown here.

those required for sustenance. The spacecrew must eventually have the capability of regulating a closed food cycle, with atomic conservation, and the repeated passage of the same atoms through their bodies."

Under Dr. Clark's plan, synthetic compounds, carefully balanced, would be carried as food, recycled from waste and consumed over and over again. The inventory of atoms would be the same at beginning and end of the trip.

Substance included in the Clark diet would include such items as water, glucose, cellulose fiber (for bulk), amino acids, fatty acids, minerals, and vitamins. The diet envisaged by Dr. Clark might, in his words, be described as "enriched sugar-water thickened with shredded paper towel." There were good-natured moans from even the scientific audience that heard Dr. Clark's paper.

But to get back to earth, or back to the day after tomorrow, when it will be necessary to feed the men not only in super-altitude aircraft, but in space stations, and on trips to the moon as well.

What are today's planners doing to meet the immediate needs of space and space-equivalent feeding problems?

The problems are being attacked by a team of Air Force Aeromedical Laboratory researchers at Wright-Patterson AFB, Ohio, working in close cooperation with the Army's Quartermaster Food and Container Institute in Chicago.

From the ground up to the 15,000-foot level, feeding is no special problem, and yesterday's research is being effectively put to work today. Anyone who has flown commercially or in a military plane has enjoyed the results of low-altitude feeding research. The flight lunch, including sandwiches, fruit or light desserts, milk, coffee, or tea, has proved quite successful, from a nutritional standpoint and as a relief from the tedium of smooth flight. Storage and preservation of such foods are no problem, nor is preparation. Such box lunches are usually eaten cold within five hours after takeoff. Sample menus include such items as ham, cheese, or chicken sandwiches, fried chicken, milk, and fruit juice. These packages weigh about two pounds.

Other low-altitude approaches include lighter weight, complete precooked frozen meals packed in disposable

foil, which can be heated in half an hour. Such packets weigh about fourteen ounces, and a dozen different menus are available: ten tray meals and two casserole-type servings. They include such items as roast turkey, Swiss steak, beef patty, tenderloin steak, and pot pies of chicken and beef. The Air Force is also using another type of ration, made up of cans of meat, fruit, bread, and dessert plus an accessory packet of tea, coffee, etc. Packet weight is about one and three-quarters pounds. Some components are (as C-rations) tastier heated, but the meals can be eaten cold. In the low-altitude range, researchers do not have to cope with personal crew equipment such as oxygen masks.

As we go higher, to the 15,000- to 40,000-foot altitude levels, the problems increase. Depending on pressurization, personnel must wear oxygen masks at times. Gas-producing foods must be avoided, because of decreased cabin pressure. The crewman must dispense with many of the niceties of eating, taking his meals when pressurization is sufficient to allow him to doff his mask. Not too much inflight eating is done now, but as flight durations increase, so will the feeding problems.

To meet such problems, Air Force researchers are devising concentrated food tablets, a variety of which have already been developed in prototype. These are about one-and-a-quarter inches in diameter and three-eighths of an

Drinking your dinner—nearly. Above are samples of liquified meals which have been studied by USAF for inflight feeding. Shown, high-energy ham, beef, chicken menus.

inch thick. Available and being tested are tablets of cheese, chocolate, plain milk, and flavored milk. Also, very compact versions of the conventional box lunch are being used, with bite-size components designed to be eaten in two meals—three portions within three hours after preparation and the second three within twenty hours. The box lunch approach has been standardized for use between 15,000 and 40,000 feet.

Beyond 40,000 feet, feeding problems become formidable, and it is at such altitudes that edge-of-space men will operate in the years just ahead. Foods will have to be highly nourishing, capable of being consumed through an aperture in a closed pressure-suit helmet, and must last (eventually) for flights of several days.

Two approaches are under way in the Air Force. The "squeeze" method using liquid and semiliquified foods and the "lipstick" method in which solid foods are freeze-dried and compressed into half-inch-diameter sticks weighing about one ounce. The sticks are inserted into the aperture in the crewman's pressure helmet.

Under current test is a squeeze-tube liquid feeder developed by the American Can Company. Four men in 40,000-foot-altitude simulators at the Nutrition Section of the Aeromedical Laboratory at Wright-Patterson AFB, Ohio, recently tested the tube method of inserting plastic nozzles into helmet facepieces, and squeezing the liquified foods into their mouths.

The squeeze tubes, made of aluminum, weigh only nine grams, are not affected by pressure differences inside and outside the crewman's helmet, and can withstand the processing needed to sterilize the food. Menus include such liquid and semisolid items as flavored milk, fruit juices, chicken, beef, and ham.

One of the advantages of the liquified food approach, some researchers feel, is the ability to replace heavy losses of body fluids in extreme high-altitude flight, especially under stress conditions.

Another method which has been studied for dispensing liquids and semisolids is the gravity-feed can. This system uses a plastic tube extending from the crew helmet with a special end device that punctures the feeding can. Foods are designed to be eaten a little at a time over a period of about a half hour.

It is significant that when we reach these 40,000-foot-plus altitudes, the problem of feeding involves not only providing well-balanced, easily digested, low-gas and low-residue foods but also the mechanics of feeding a man while his head and mouth are encased in a helmet.

This brings up a matter that, at least during the initial stages of manned spaceflight, will further complicate space-feeding plans. Will spacecrews be able to remove their pressure suits inside their ships? If not—and it seems unlikely in early spaceflight—they, too, will have to eat via some method similar to the squeeze tube.

Yet, as astronautics advances into more sophisticated stages, as the manned satellite evolves into the large-scale manned space station with many crew members, it will doubtless become necessary, for psychological reasons alone, to allow spacecrews to remove their bulky pressure suits in their sealed cabins. No one knows today how long a man can stay inside a spacesuit without becoming "stir crazy." The problems of ventilation, heat and moisture dissipation, disposal of waste, and the like are overwhelming.

So, it may well turn out that as soon as aeromedical researchers solve the feeding-in-a-pressure-suit problem, they will be faced with the opposite—how to again approximate the pleasantries of more conventional eating in the spaceship whose crewmen are traveling in sport shirts, so to speak.

By then we may well see a space-feeding arrangement somewhat like the system visualized in *Conquest of the Moon*, the imaginative book by space scientist Dr. Wernher von Braun, astronomer Dr. Fred L. Whipple, and Willy Ley, and edited by Cornelius Ryan.

These writers suggest that members of a spacecrew eat around a table fitted with an arrangement of tracks on its surface. Precooked meals in covered containers would be hooked onto the table tracks and would run through an electronic heater "station," after which they would ride on their rails back to the diner, who would eat his food with tongs, taking precut bite-sized portions from the container through a specially designed opening. Liquids would be drunk with help from our old friend—the squeeze bottle. And the crewmen would be anchored to their seats around the table by straps.

Someday, barring unforeseen hazards we may know nothing about today, men will land on the moon and will make their way to the planets. At this writing, the first American giant step in that direction—the Air Force instrumented probe of the moon's vicinity—is being readied at Cape Canaveral, Fla. Instruments don't have to eat. Human beings do. The work of today's Air Force researchers is leading to the knowledge that will provide the means for that vital nourishment.—End

How Real Is Our Shortage of SCIENTIFIC MANPOWER?

By Ralph H. Hardin

SINCE Sputnik there has been an outpouring of comment and complaint on what has been described as our national shortage of scientists and engineers. We have been warned that the United States faces serious consequences, possibly the loss of technological parity with the Soviet Union, if we fail to make the most of our resources of talented people.

Yet, at the same time the country is in an economic recession, and in some communities engineers have lost their jobs along with other workers. And, generally, demand has declined for both graduating engineers and those with some work experience under their belts.

How can these two seemingly opposite situations exist? Is there really a shortage of scientific manpower? Or is poor planning and utilization creating an artificial shortage?

Let's examine the present needs for scientists and engineers. What are the requirements of industrial, institutional, and governmental employers? The irony is: no one really knows. There is a dearth of solid facts in this area, which is a real handicap. And to complicate matters, we are dealing with a rapidly changing situation. Employers who were laying off engineers a few months ago are now running big ads in the New York *Times* for the same kind of professional people. Demands change from day to day. Employers establish some jobs and abolish others, government agencies inaugurate, expand, or curtail programs; jobs are created by, or changed by, developments in our technology. Not only is the situation changing rapidly and presenting the statistician with a moving target, but every job contains a varying amount of professional duties.

If we concentrated the professional duties in fewer positions by "job engineering," would fewer professional people be needed? And what about jobs for which it is useful but perhaps not *vital* to have a fully qualified technical man? Is a "sales engineer" a salesman or an engineer? Even if we could add up *all* the jobs, occupied and vacant, for a picture of the total market demand, there would still be a question whether the demand for such people represented actual current needs. Too often employers hire scientists and engineers to acquire or retain a "technical capability" necessary to secure government contracts. They have been known to "stockpile" professional people who are unneeded at the moment for later transfer to new activities where they can be used.

Again complicating matters is the diversionary demand created by military service requirements for graduating college seniors. The strong possibility of draft military tours which the Selective Service Act creates pushes many technical college students into ROTC with an active-duty tour on graduation. Yet many engineering and science graduates take Air Force flight training when they should be in strictly technical fields. And for those who *do* go into technical assignments, fluctuating vacancies often create situations where a metallurgist, say, finds himself working as a supply officer. On his departure from active duty, such a technical graduate is three years out of touch with his profession.

In light of the foregoing there exists, in the Air Force at least, an overriding "demand" for professionally qualified college graduates which does *not* directly relate to the requirements of the Air Force for manning professional jobs. This irony keeps many young officers from making a career of an Air Force which is rapidly becoming more technical and, according to the Stever Ad Hoc Committee on R&D, declining in technical level at the same time.

In the absence of really reliable data on needs from employer sources, the best evidence of need is the recruiting activity conducted by employers. During the past year, budget reductions, expenditure slowdowns, project cancellations, and the recession have noticeably affected the evidences of labor market demand for professional personnel. Ads for scientists and engineers, use of employment service facilities, and visits by recruiting representatives, though currently reviving, have been sharply curtailed. Reports from the campuses reveal that industry representatives held the reins at this year's interviews and made the selections, reversing the situation of a year ago when the *students* conducted the interviews and did the choosing. Yet for graduating scientists and engineers there were still plenty of jobs, and only those students with marginal academic records experienced difficulty. Although defense slowdowns somewhat curtailed opportunities for experienced professionals for a time, a glance at the help-wanted columns of your Sunday newspaper attests to the revived demands created by releases of defense funds.

Right now, despite current economic conditions, the demand still seems to exceed the supply for these kinds of people. Revival of the economy will further stimulate demand.

(Continued on page 52)

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Other post-World War II activities included the production of wings for the B-47 bomber, high-velocity aircraft rockets, tanks and the development of improved aerial cannon.

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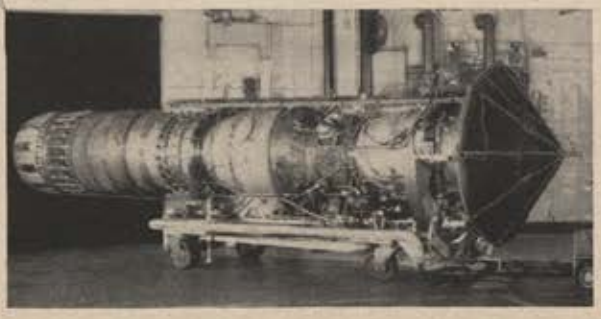
1952—Ford defense activities include production of bomber wings for B-47's.

1954—Ford produces Pratt & Whitney J-57 turbojet engines at Chicago Government Plant #39.



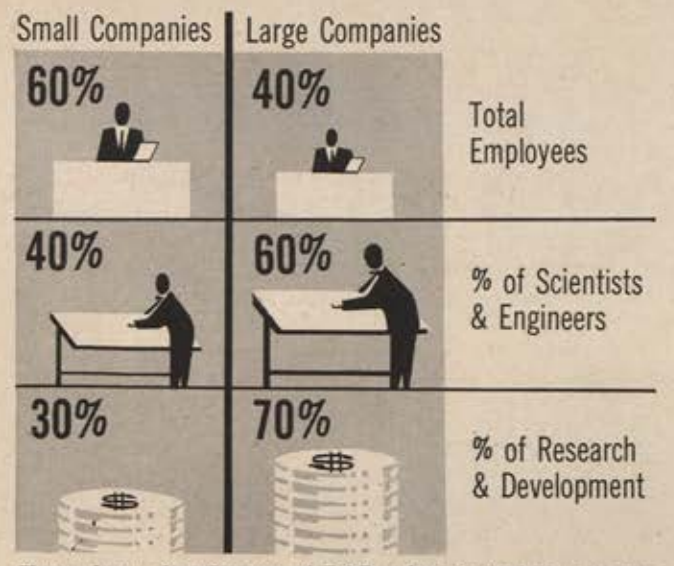


Chart shows distribution of R&D talent in industry. Large companies, with forty percent of work force, have sixty percent of scientific manpower, do seventy percent of R&D.

There is evidence, too, of an imbalance in the distribution of research and development talent in industry. Large companies with forty percent of the total employees have sixty percent of the scientists and engineers and do seventy percent of the R&D in terms of monetary cost. Many companies which at present do not perform or subsidize such activities are likely to be faced with a problem of survival unless they equip themselves to compete with more advanced, better quality, and lower cost products which their competitors may market. The expanding national level of R&D expenditures, and their persistence despite the recession, may reflect to some extent recognition by these companies of their problem.

At present, and for years to come, a large proportion of the national expenditure for R&D will be for the requirements of national security. This leads to a concentration of scientific talent in the defense sector of our economy. Moreover, committees of eminent citizens have pointed out serious deficiencies in our national security programs which would require federal expenditures to be stepped up sharply by billions of dollars to secure the solutions for extremely difficult technical problems. Although the Administration shows little evidence of action of the scope recommended, defense expenditures are nevertheless rising and are unlikely to level off for many years. Thus, we can expect increasing demands upon our already short supply of technical talent before long-term programs to increase the supply are productive.

Further needs will arise in proportion to our response to the Communist economic and cultural competition. Economic and technical assistance to former colonial countries and knowledgeable competition in the trade of goods and ideas are going to require a good supply of not only technical people but experts in the arts and humanities too, both here and overseas.

What does all this add up to? Just that as there exists an undefined and fluctuating situation with respect to *demand* for these professionals, there also exists a similar situation with respect to the *supply* of these people. One complication, already partially cited above, that blurs the picture is that many technical people—in their jobs—really do not perform technical functions. Advancement avenues take a man from technical work into managerial posts. A number of companies stress that they are "engineers' companies," implying that they are run by and with consideration of the needs of engineers, but also implying that engineers may be performing many of the nontechnical jobs. Nonengineering positions for which engineering degrees are required are frequently to be seen in the classified advertisements. Technical background is frequently required for positions in manufacturing, sales, purchasing, and others.

So, it turns out that people who call themselves engineers may be upgrading their true status in the same way a bookkeeper calls himself an accountant. Or they may merely be reflecting the breadth of the dictionary definition of engineering occupations. Thus, census figures of the numbers of those employed as "engineers" significantly exceed any reasonable estimate of the real number of employed professional engineers based on the output of institutions granting engineering degrees. So we get a confused statistical picture of supply.

Also, many people without full professional training perform a narrow range of fully professional duties. Others with professional training are utilized in subprofessional jobs which demand less than their full professional skills, leading through disuse to the loss of such skills.

People in many of these semiengineering assignments are not truly part of our technical personnel reserve. Yet, the superior rewards and job-to-job progression in industrial management and sales, the investment of years in other career areas, in the case of many technically educated Air Force officers, argue against any significant voluntary flow toward *fully technical* "bench" jobs in science or engineering. If the rewards were high enough, many both in government and industry would "return to the bench" in the laboratories. But to do this, management would have to accept education which was obsolescent and men who had passed the normal peak years of creativity. But there is no such trend. Despite high entrance rates of pay for beginners, management is not generally increasing the pay scales of *experienced* technical people proportionately. In response there has been a significant trend toward the organization of engineers for collective bargaining purposes. It is unlikely that a significant number of professional people could be secured in peacetime by "reclamation" programs even if these programs were completely desirable.

Regardless of whether we can ever get a true picture of supply and demand, what we have to do is to educate more and to better use what we have now. Because scientific and engineering manpower is a "long lead-time item," proposals for college scholarships, aids to science teaching, federal aid to education, and stimulation of science interest in the young cannot be of much help for the needs of the next few years. The value of such measures must be determined by their suitability to the long-term needs of our society. Some 3,000 high school graduating seniors capable of college work do not go on to college for lack of means or motivation. Yet, if means and motivation were provided, those who went to college would not become part of the resource of professional manpower until 1962. In talking about improving our high schools for today's bright eighth graders, we are talking about 1966-1969 recruits to the learned professions.

In the May '57 issue of AIR FORCE, AFA President Peter J. Schenk, in an article entitled "More Mileage from Our Engineers," made an eloquent plea for American management to take some straightforward steps to increase our *immediate effective supply* of engineers by giving them more nonprofessional assistants and by removing nontechnical tasks from their jobs; by improving their physical working conditions to make thinking possible; by im-

(Continued on page 55)

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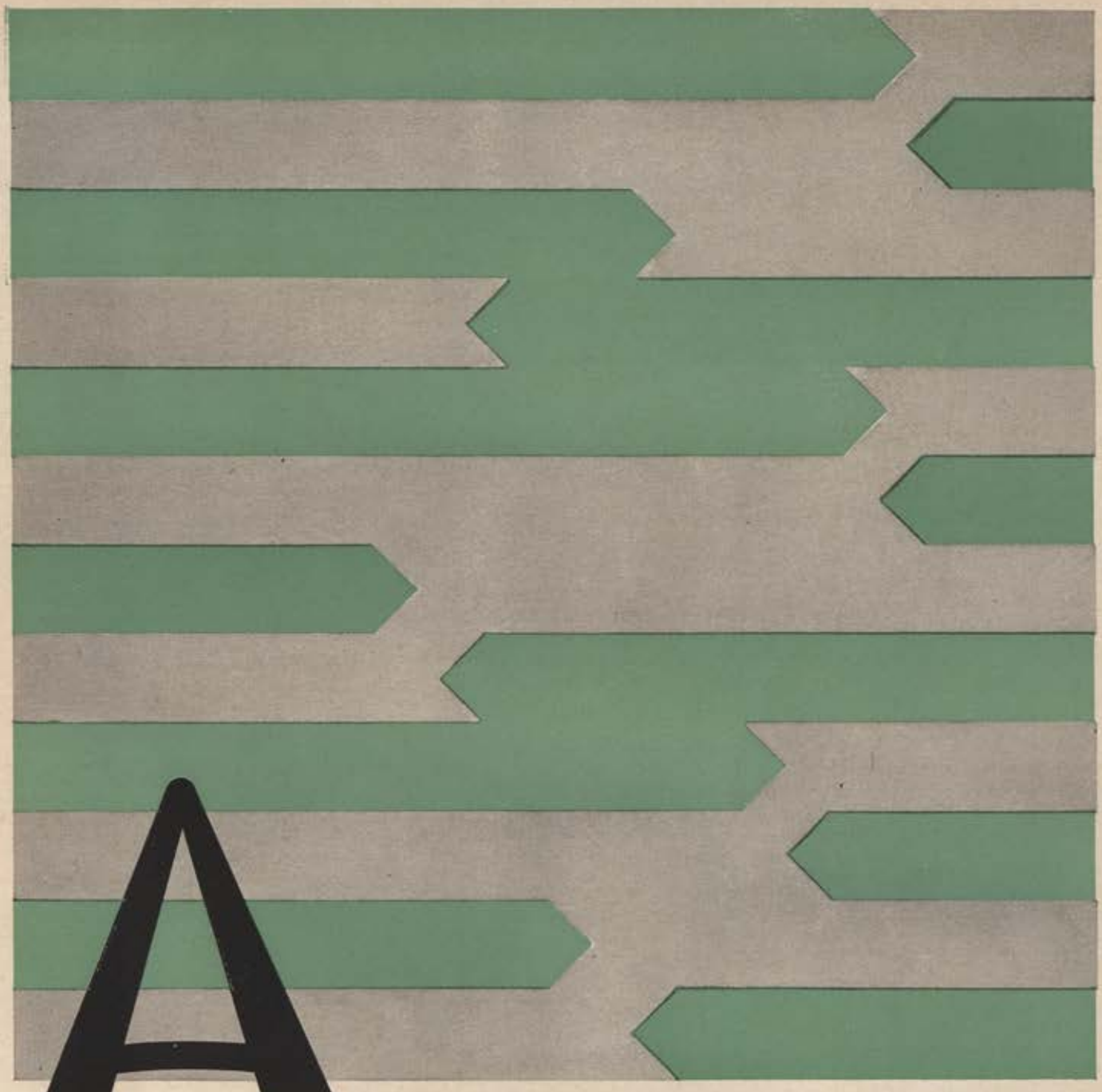

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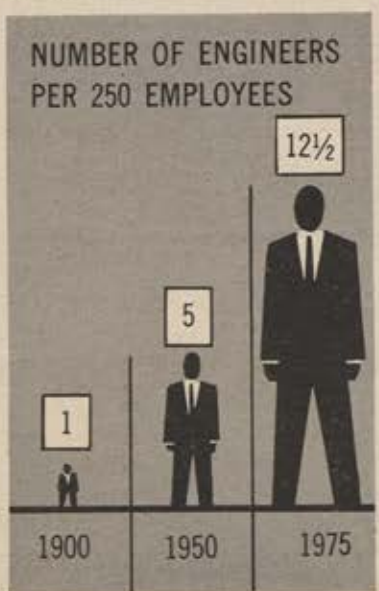
proving career prospects and pay for experience. To these he added the more difficult steps of better organization, better planning, and better decision making. I should like to suggest some additional areas for management consideration in establishing programs for maximum utilization of these resources:

- Top management, in private industry or government, should recognize the problem and make it a definite part of the job of a key official to plan and organize activities for better management and utilization of scientist and engineer resources.
- Management should give close attention to the "environment" in which technical work is performed to assure successful performance of the technical mission. The methods used in supplying men, money, and materials to technical laboratories should be designed for maximum service and minimum administrative burdens. Administration should not be allowed to become an end in itself, nor should procedures applicable to nonresearch and development activities be necessarily applied to R&D in a desire for organization-wide uniformity.
- Management policies should stimulate the professional communication which is the lifeblood of scientific work. Technical papers and reports, professional correspondence and meetings, libraries and documentation can ease the road of progress. The more the searcher knows of what others in his field are doing, the more likely he is to come up with new findings. Otherwise there is a real danger of duplication of effort and loss of stimulus.
- Supervisors responsible for guiding the work of their team members should also be assigned responsibility for guiding their professional growth. Advanced education, publication of professional papers, participation in professional societies and meetings, professional attitudes and standards should be encouraged by the employer. Management should stimulate such growth by bringing to the laboratory or plant, graduate courses, seminars, lectures, professional meetings, consultants, graduate students, etc.
- Professional societies should be encouraged and supported. They develop and maintain professional standards and communications. Their journals are the principal medium for the dissemination of scientific papers but are currently experiencing difficulty in publishing promptly the expanded output of such papers. They need support from the industrial corporations and government agencies.

Now what about long-term needs?



Increasing demands of industry for technical manpower is shown in terms of number of engineers per 250 employees between 1900 and what is expected to be the situation in 1975.

ABOUT THE AUTHOR

A long-time student of management, Mr. Hardin has served ARDC as Chief of the Personnel Plans and Policy Division where he had an opportunity to study in depth the complicated problems of utilizing our scientific manpower.

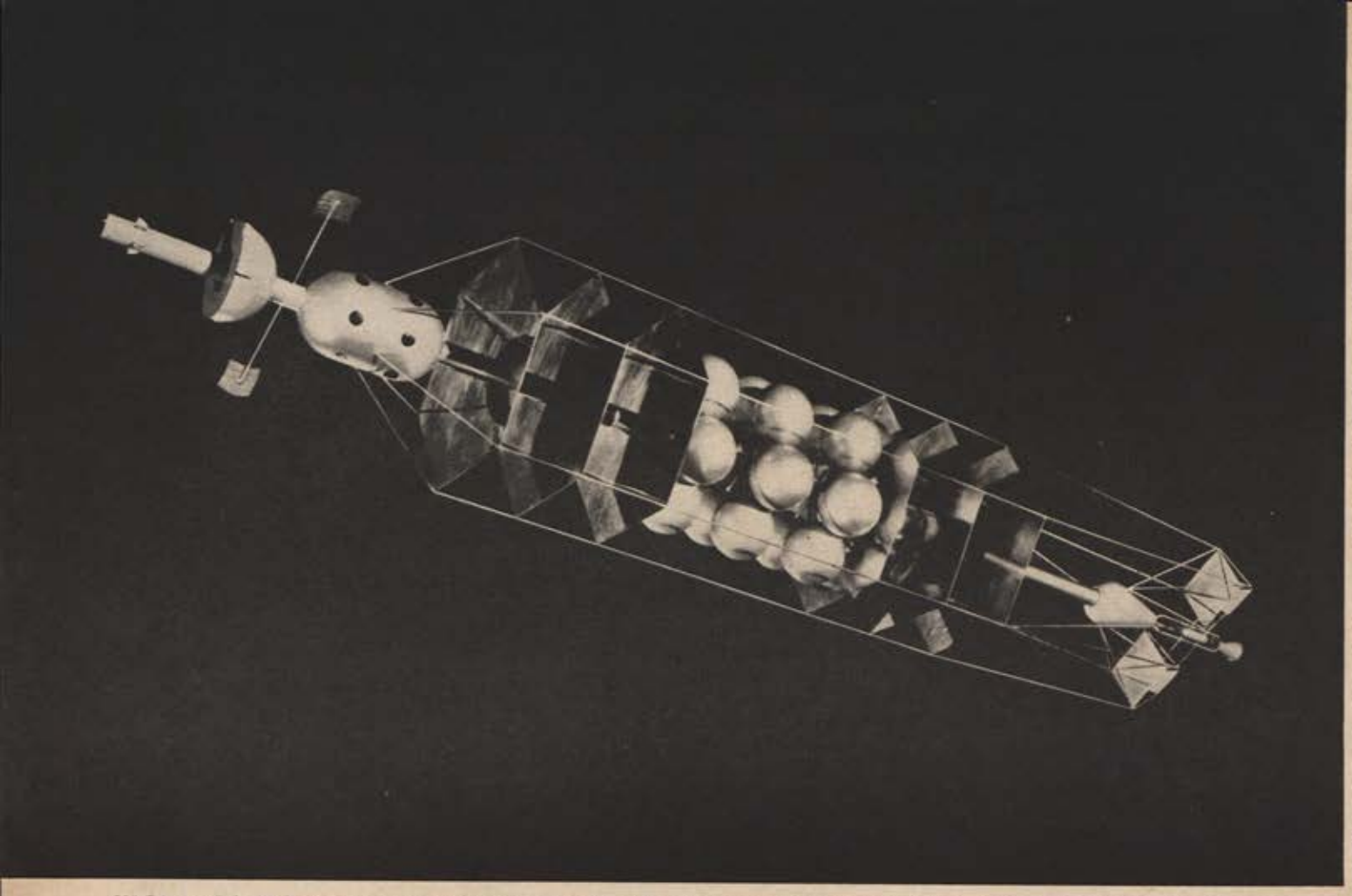
There has been a constant growth in our need for scientists and engineers. Whereas industry employed one engineer per 250 employees in 1900, in 1950 this ratio was one per fifty employees. By 1975 the ratio is expected to be one per twenty. Scientist demands, though smaller, are expanding with equal rapidity. These trends apply equally to government and private organizations. Even if there were no cold war, developments in energy sources, nucleonics, communication, health, materials, automation, data-processing, and transportation would create heavy demands for people with high technical skills. Depleted resources and more technical products demand more complex processing which must be designed and guided by the professionally trained. The possibilities of unlimited energy from nuclear fusion and unlimited food from synthetic photosynthesis, the conquest of disease and aging are no longer impractical dreams.

Perhaps the most critical aspect of our future need is that of the *quality of talent* which will be required. Great advances come from the theoretical insights of a very few individuals. Only by assuring that all bright children have ample opportunity and stimulus to progress as rapidly and as far as their talents and interests take them can we be confident that great scientific leaders will come to the fore. To foster the development of great minds and those needed to assist them in the exploitation of their discoveries, we must provide opportunities for the full development of the latent talents of all of those in our population capable of intellectual effort.

Not only must we make changes in our educational opportunities but we must change governmental and industrial policies to provide: long-term management and fiscal support for a stable high level of technical activity, especially in basic research; substantial profit incentives for industrial firms to engage in research and exploratory development as such, regardless of "hardware" manufacturing; and positive tax encouragement for scientific and technological growth. These are important means of providing some of the economic bases for the effort needed by our society and the resulting jobs and careers for the output of stepped-up educational programs. They will also provide encouragement for the support of basic research which, although a contributor to tomorrow's products and weapons, is at a disadvantage in competing for today's dollars against today's dividends or military operational capability.

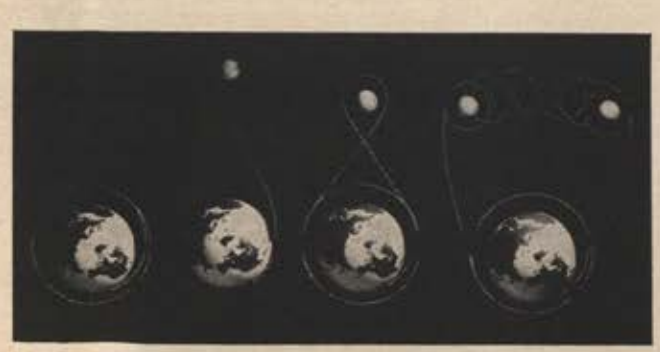
In planning for the future we should bear in mind that the great challenges are not limited to the fields of science and technology. We face the explosive forces of poverty, anticolonialism, nationalism, economic competition, as well as Communist imperialism, which will require the best sociologists, economists, psychologists, diplomats, and others whom we can develop. Let us also remember that the great technical discoveries will be meaningless unless they can be applied to great purposes.

Scientists and engineers cannot alone relate their findings to social purposes. The latter must come, in large degree, from the philosophers, the social scientists, the clergy, and those skilled in the arts of government to assure the translation of great discoveries not only to a high standard of living but, more important, to the growth and dignity of the human spirit.—END



NACA model of hypothetical spacecraft equipped with components of nuclear rocket propulsion system, at right end of model, placed far from crew area. At extreme left are crew compartment and landing vehicle. Fuel tanks are in center.

NACA's AEROSPACE TRANSITION INTO NASA

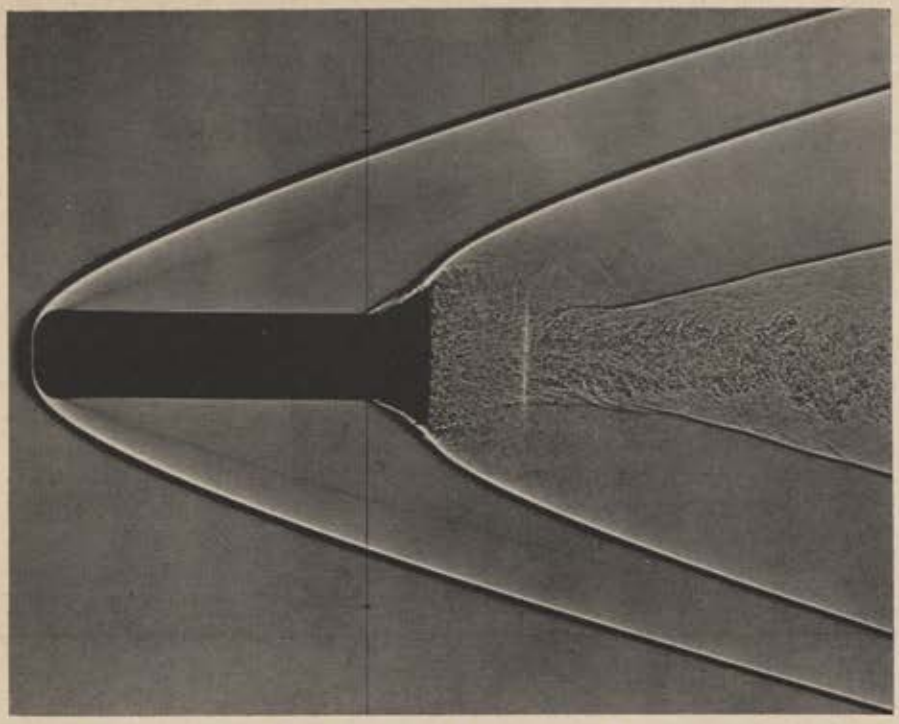


NACA moon mission possibility diagrams: satellite in earth orbit, moon impact, once around and home, multiple orbits.

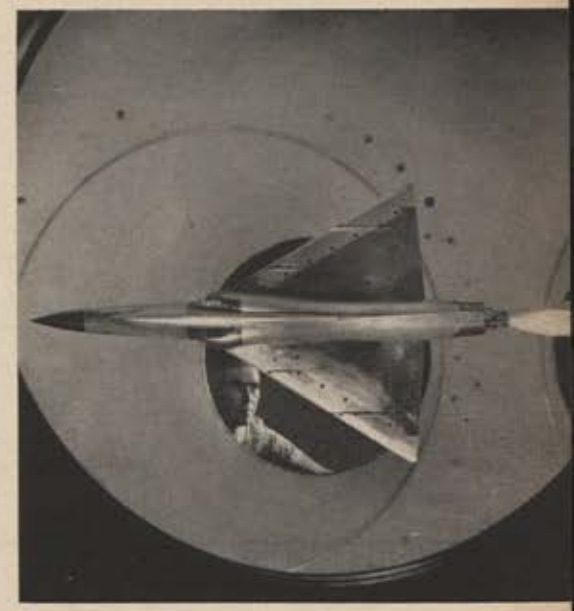
AS THE National Advisory Committee for Aeronautics moved this month toward its new status as the nucleus of the new National Aeronautics and Space Administration (*see* "Airpower in the News," *page 29*) it was taking with it a backlog of projects, at least half of which already had significant space technology application.

Under study at NACA sites such as the Ames Laboratory at Moffett Field, Calif., Langley Aeronautical Laboratory, Langley AFB, Va., the Lewis Flight Propulsion Laboratory, Cleveland, Ohio, and the High Speed Flight Station, Edwards AFB, Calif., were vital space age questions including atmosphere reentry, sophisticated propulsion systems, navigational systems orbit and launch problems, heating and cooling of materials, and numerous other technical questions for which answers must be found.

The NACA battery of research tools to explore these questions is impressive and—as NACA phases into NASA—will increase, with increased funds and personnel. On this and the following pages is a picture report on some of today's NACA space projects—preludes to an even bigger tomorrow.—END



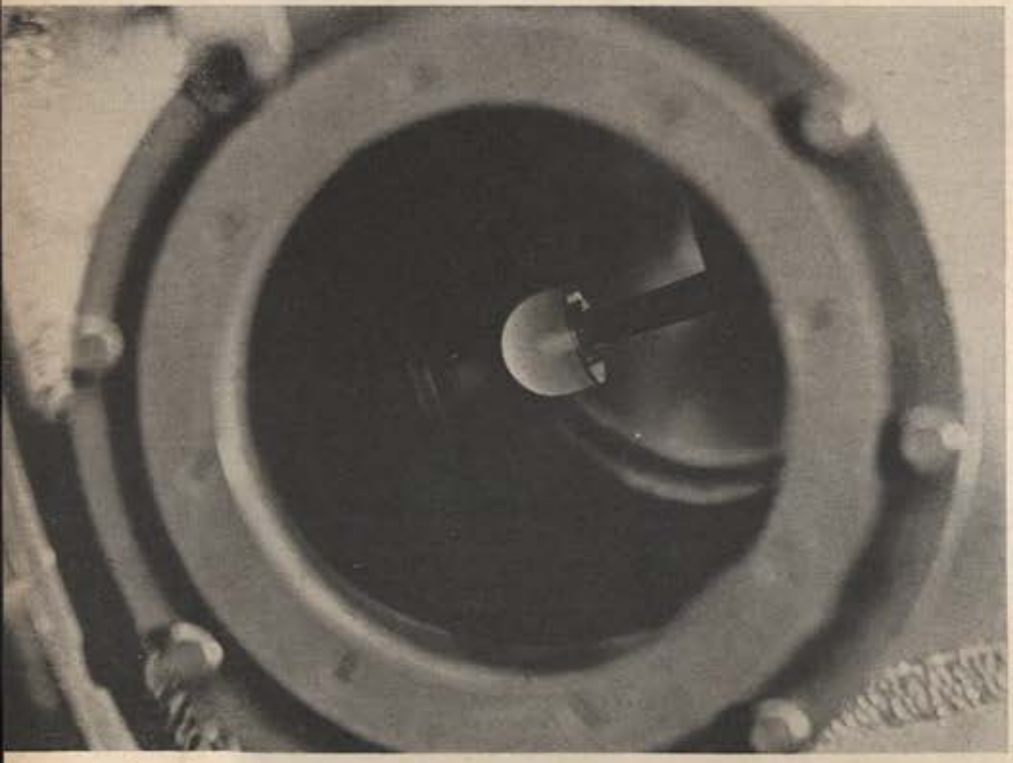
Stability studies in flight are made with gun-launched models in NACA's Ames Laboratory, Moffett Field, Calif. This blunt-nosed cylinder has been "stopped" at Mach 7 with high-speed photo. Shock wave protects model from heat damage.



An NACA scientist examines a Convair F-106 model undergoing aerodynamic testing at Ames Lab. Airspeeds up to Mach 3½ are reached in the facility.

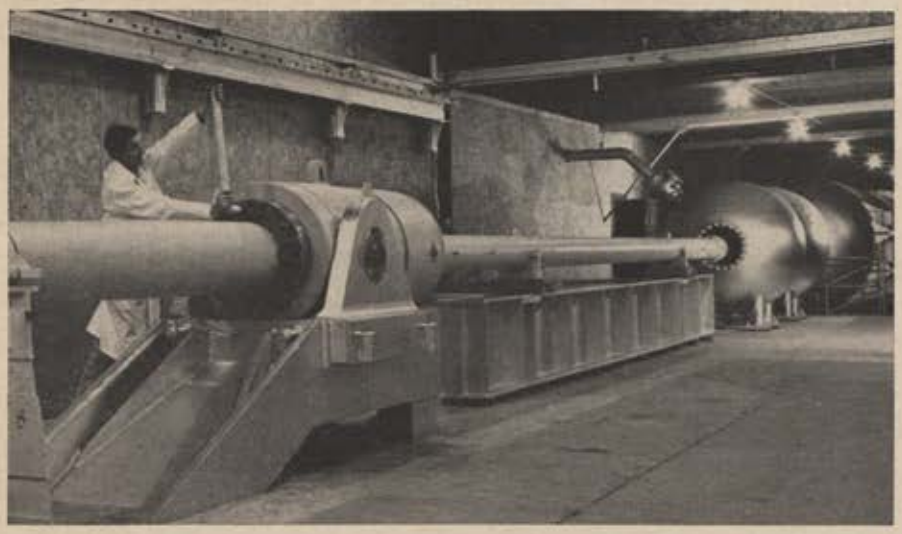
Hypothetical spacecraft equipped with components of a typical electrical propulsion system. Nuclear reactor is at far left. Behind reactor are shields and heat-exchanger. At the rear of the model are two crew cabins and landing vehicle.

Ionized gases may cause surface pitting on the skins of spacecraft flying within earth's or some other planet's atmosphere. Ion accelerator pictured is used by NACA to study ion impact effects at speeds of 15,000 mph or even faster.



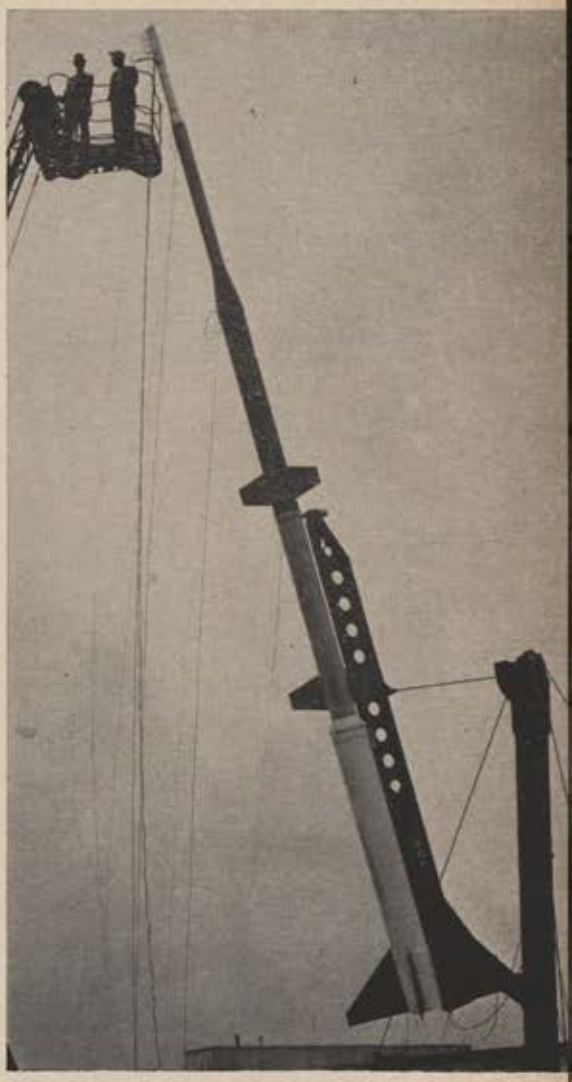
Steel hemisphere mounted for tests in an aeronautical research device known as a pebble-bed heater glows at 2,000° F. at Ames Lab. Thermocouples within the model collect data needed for successful spacecraft and missile design.

Atmosphere entry simulator at Ames is research tool to determine the reentry suitability of specific designs.



Huge coupling links pump with launch tube of NACA's Hypervelocity Ballistic Range, used to drive aerodynamic models up to speeds of 16,000 mph. Tanks at right absorb blast as models leave muzzle.

Technicians adjust high-pressure couplings of Ballistic Range, also pictured in photo above. Beyond camera's view is a 500-foot-long tank through which test models fly. New knowledge of missile, spacecraft reentry performance comes from this gear.



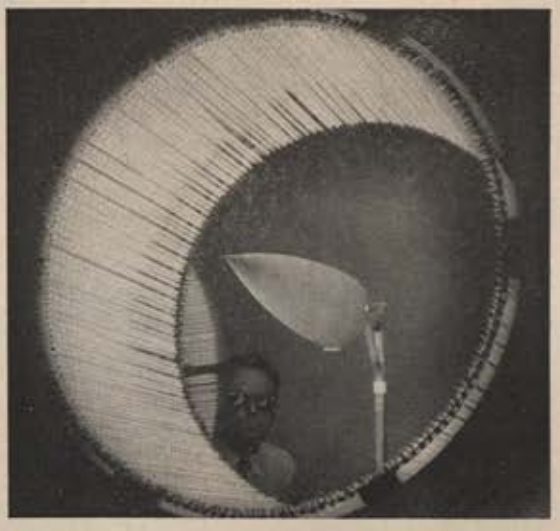
At right, five-stage rocket-powered test vehicle is readied for launching at NACA Pilotless Aircraft Research Station located at Wallops Island off Virginia.

Data from rocket firings aids missile and spacecraft development. In five-stage firing, below, first two rockets are fired early for altitude, third stage is delayed till reentry angle is reached. Stages three, four, and five are then fired to drive test body at high speed through atmosphere. Fifth stage contains instrumentation for telemetry home.

Two-stage sounding rocket fired by NACA in successful test of ejection and automatic inflation of twelve-foot spherical satellite, made of micro-thin aluminum foil bonded to plastic. Launch was from Wallops Island site.

Satellites devised by NACA scientists, as described above, have been proposed for use as moon probes. Propelled into space in deflated condition, they would be inflated in orbit with nitrogen gas.

NACA scientist behind glass panel and wearing protective glasses observes test of missile nose cone exposed to simulated aerodynamic heating in cylindrical radiator by the use of quartz-tube heat lamps.



Miniature ion propulsion unit producing detectable thrust is studied by NACA scientist. Ion propulsion is one of possible advanced spacecraft propulsion methods. System would be able to operate on smaller fuel supply than chemical method.

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It's the little things that count — things like mail —
and for the unsung chopper pilots whose job it is to deliver the goods
to the men of the Texas towers, getting through fog and foam is . . .

MORE GUTS THAN

By Michael Gladych

LIKE a giant grasshopper, the H-21 helicopter danced clumsily in the gusty headwind. Inside the narrow cabin, nine airmen sweated in their exposure suits and furtively glanced through the windows at the angry, winter Atlantic 700 feet below. They were the longed-for relief for nine other men, waiting to go ashore from Texas tower two, 100 miles out to sea from Cape Cod.

Animated by the bumps, the precious cargo of mail and radar parts jerked frantically at the tiedown straps. The engine roar filled the cabin, sending shivers through the fuselage.

Up front, in the fishbowl cockpit, the pilot anxiously eyed the engine gauges, peering ahead now and then. The copilot, balancing against the gusts, made a pencil dot on the fuel consumption chart. "Just passed the point of no return," he said into the intercom.

"Where the hell is that tower?"

As though in answer, the radio crackled in the pilot's headset: "Six miles due west from us. Steer one-one-zero and keep your eyes peeled—we're losing you in the sea clutter on the scope . . . over."

The copilot pointed. "There she is!" But there was no relaxing. The two pilots tensed, for beyond the radome bubbles a fog bank rolled on, reaching clammily for the spindle-legged tower.

The chopper bulged its Plexiglas eyes in an effort to beat the fog to the landing deck, but as the machine finally bucked into a hover, the thickening fog swallowed the flight deck, the radomes, and the lifeboat cranes.

The pilot cursed softly. Sweat ran from under his crash helmet as, ignoring the precession-crazed gyros, he slowly let the chopper sink into the fog by feel and prayer.

Below, the towermen craned their necks toward the engine roar and held their breath. Groping in the chilly whiteness, the machine materialized overhead. Its hind legs outstretched, the chopper touched the painted deck lines, then slumped on its nose wheel with a grunt of relief. Another Texas tower support flight had arrived at its destination.

The three Texas towers are a vital, multimillion-dollar investment in national security. Even when hurricane weather forces picket planes and ships off their stations, the towers go on swiveling their PPI (plan-position indicator) antennas—business as usual. That's why the towers rank tops in the eastern early-warning chain.

It's plain logic of logistics that this important link is only as good as its supply lines. Surface vessels deliver cargo ranging from diesel fuel for the power generators to toilet paper, but reliable as ocean-going ships are, often they can't make it. As one skipper puts it, "I hate to admit it, but when it comes to landing something on the towers in rough seas, I either have to wait for better weather or let the flyboys carry the stuff for me."

The "flyboys" are the fourteen pilots of the six H-21 helicopters stationed at Otis AFB, Mass. Apart from pitching in for the supply vessels with radar spare parts shipments, they shuttle the tower personnel to and from shore base, run an ambulance service, act as an airborne grocery, deliver movies, and boost the towermen's morale by bringing the vital mail.

"I don't know what we'd do without the helicopters," says Lt. Robert Stetkiewicz, adjutant of the 4604th Support Squadron (Texas towers). "Most of the time, they're the only link the towermen have with the outside world—a lifeline in more ways than one."

One look at the statistics and you'll understand why the helicopter pilots enjoy almost a pin-up popularity with the towermen. Their monthly average of priority cargo and mail carried per tower is 50,000 pounds, plus some 2,000 passengers flown to and fro. And although officially restricted from IFR (instrument flight rules) operation, one out of every three missions is flown in marginal weather and often in downright dirty soup. This, on one engine and over water that stays blood-freezing cold eight months a year.

If you didn't see the H-21s beetling across the Cape Cod sky, you wouldn't know there was a helicopter outfit at Otis. They are well camouflaged in the base phone directory—a sort of "Cinderella" of the 551st Operations Squadron. The choppers' ops room is hidden, too. But let's follow a couple of pilots just back from a support mission.

Through the wood-paneled splendor of the base ops, you come into the drabness of a temporary building.

GLORY

Fingers crossed, maintenance officer Capt. Ken Brooks waves from the H-21.

There is no sign on the door of the small room. Walls plastered with maps and charts, a file cabinet, two steel desks, telephones, and a model of the H-21 helicopter—that's helicopter operations.

Unless the weather is so messy that even Cape Cod's hardy seagulls stay grounded, the chopper operations room is empty, for the outfit is among the busiest on the base. One helicopter always stays on fifteen-minute alert to help out in case of a rescue—a crash around the base or perhaps a Boy Scout lost on a camping trip. And the remaining helicopters in commission fly the tower support.

The most accessible tower is three—only thirty-four miles off Nantucket Island. Tower four is what the pilots call "marginal"—sixty miles over water from Suffolk AFB on Long Island. But tower two is different. It soaks its feet on Georges Bank, ninety-seven miles east of Cape Cod.

In order to get to tower two, a support chopper must land at Chatham and refuel. But even with its tanks full, the H-21 might easily get in trouble over the capricious Atlantic. Should there be a thirty-mile headwind, the loaded chopper might not be able to get back to Chatham if the tower landing became impossible for some reason. And there are several such reasons.

Although the tower has a weather observer who checks in by marine phone with Otis every three hours, the sea fog might roll in faster than you can say "IFR." If the pilot gets the fog warning before he hits the point of no return, he simply aborts. But if the warning comes too late, as it often does, there is no choice.

"It gets hairy at times," says Lt. Edward "Sonny" Blondell, one youthful aircraft commander. "I've landed on the tower in the fog, but I wouldn't like to make a habit of it—it wouldn't help my longevity any."

If you look at the handkerchief size of the tower's flight deck, you'll see what Sonny Blondell means. The landing area has 5,885 square feet. It seems like a lot until you realize that the fifty-two-foot-long chopper fuselage has only a few feet of deck space on each end. The rotor blades hang over the water, and it wouldn't take much to miss the deck in bad visibility or in a gusty wind.

"Actually, it's the gusts that bother us more than the fog," explains Maj. Wilbur E. Parker, the skipper of the chopper detachment. "You see, all the towers point east and with a westerly wind, we get turbulence caused by the bubble radomes. You can come in and line up perfectly, then you start letting down and suddenly it's 'now you fly—now you don't.' The crosswind turbulence squashes you down hard."

The tower landing even in perfect weather can be tricky because the small landing area eliminates the helpful ground effect that normally cushions the descent, so, as Major Parker says, "It's got to be a precision landing every time, or you get wet."

And getting wet on the ninety-seven-mile stretch over water is another possibility that doesn't please Major Parker at all. "It's a calculated risk we have to take," he says, twirling the rotor of the H-21 model on his desk. "In plain language it means that you sweat all the time. Sure, after a while you get used to the water, but then you sweat again, because you figure maybe you're relaxing too much."

To make the chopper pilots more secure, the long missions to tower two are flown in pairs—one helicopter covering the other. Should one be forced down, the other could at least pick up the downed crew and passengers before they got quick frozen.

Following this prudent arrangement, until last July one bird always carried cargo only, while its rotary-wingman had passengers on board. In case of trouble, the cargo could be easily jettisoned to make room for the survivors. But lately, most of the bulk cargo has been relegated to the surface ships, leaving only mail and critical radar parts to the helicopters—and, of course, the passengers. Thus the original protection idea of the second machine has become merely an ambiguous morale booster. "Suppose both choppers are packed with troops," says Sonny Blondell. "When one goes

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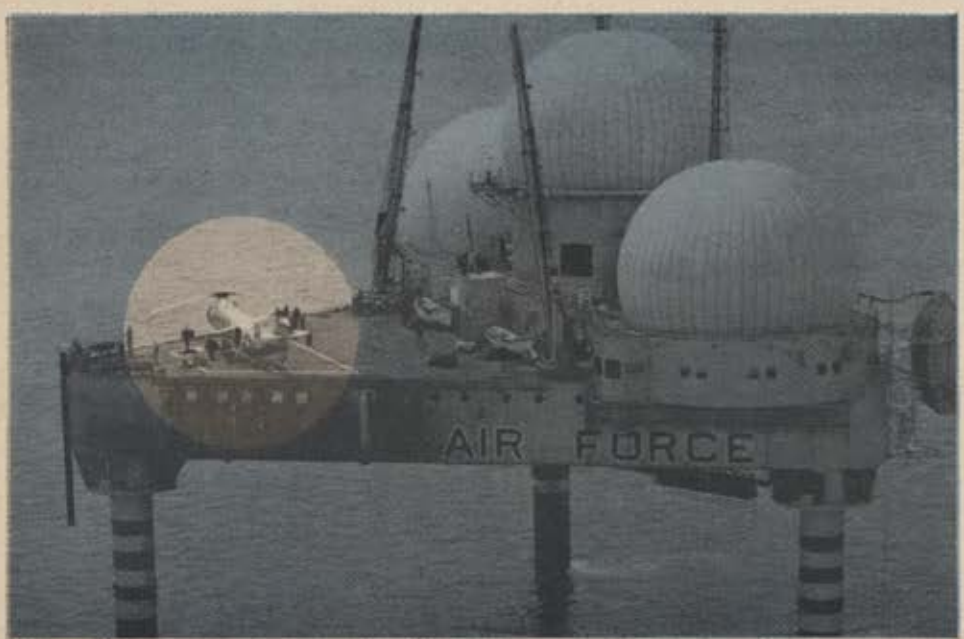

Mission done, support chopper readies for its return trip from Texas tower two.

down, you can't expect the other to dump its passengers and play air rescue, can you?"

If you have seen the New York Airways helicopters with the amphibious floats, you might wonder about the same deal for the tower H-21s. Well, they do have an emergency flotation gear. There is one permanently inflated bag in the fuselage and two outside bags which could be blown up if the single, weary engine should quit over the sea. However, this emergency gear has a serious drawback.

Flying at the usual altitude of 700 feet, you'd only have some twenty seconds before plopping into the water with the dead engine and the 13,500 pounds' gross weight. "That doesn't give much time to start autorotation," says Major Parker, "and you still have to hit the flotation gear switch and give the bags time to inflate. And even if you had enough time for it all, you might easily misjudge altitude, land a little too hard, and perhaps tear off the inflated bags."

Two of the 'copter people, Lt. Warren R. Lilly and Lt. Cecil B. Jeanes, make a check of the chopper's flotation gear during a periodical inspection of craft.

Haven't the flotation bags been stressed to allow for a hard landing?

"I guess they have," says Major Parker. He adds, however, "But they haven't been tested. And I sure hope I'm not going to be the one to do it."

Of course, the bags are periodically inflated on the ground. But, as Jacques Guequierre, the Vertol tech rep, confirms, how the emergency gear would behave in the water is only "an engineering guess."

Another nightmare of the tower support flights is a situation where the two helicopters would have to land at tower two on the same mission and at the same time. Normally, one of them stooges around while the other unloads and refuels. But with a combination of a capacity load and headwind, the cover chopper might not have enough fuel to wait.

"Well, we figured the thing to do would be to take the blades off the first chopper, push it toward the radomes and make room for the second guy to land," says Major Parker.

"It's a good thing nobody has had to try this trick, because none of the three towers has the necessary blade-pulling tools. And, even if they did, it would take the towermen, unskilled in helicopter maintenance, about an hour and a half to do the job. That would be some thirty minutes too long for the waiting chopper's gas reserve.

Mulling over this problem, Capt. Kenneth D. Brooks, the mustached maintenance officer of the helicopter outfit, had a brainstorm. The towers have lifeboat cranes, sturdy enough to hoist a chopper and swing it over water and out of the way while the second machine lands, unloads, and refuels. The Vertol people make maintenance slings which would be just fine for this emergency job.

Ken Brooks wrote up a request for three extra slings, but he hit a snag at the Middletown Prime Depot. When he explained what he needed the rigs for, the man at the other end blew his stack. "Swinging this expensive equipment eighty feet over the ocean? Too dangerous." No slings were supplied.

The most important cargo of all—the mail for the men on the towers.

Captain Brooks didn't have time to elaborate on his personal feelings about the sling incident—he was ready to take off for tower two. But just before he engaged the rotor clutch, he motioned to me to keep my fingers crossed. "It might help," he called.

"Where is the other chopper—the 'cover'?"

"Busy on another tower," hollered Brooks. "I'll go this one alone. What's the difference, anyway?"

While Brooks goes on his crossed-fingers mission, let's drop in at the 4604th Squadron for a chat with the towermen. Here, we meet a special breed of airmen. Some fifty of them are marooned on each steel island for thirty days at a stretch and sometimes longer. For this they pull overseas pay, but as one of them says, "I'd trade that pay for a more regular chopper service. You sure get claustrophobia out here when you're due to go home and the chopper is late."

M/Sgt. Robert J. Ayers, the NCOIC of tower three, elaborates on the helicopter situation. "Our chopper pilots are a damned fine bunch—they sure try hard. Why, last year one of them barely made it to the Nantucket beach on the way back from our tower. What they need is better equipment."

Then Sergeant Ayers qualifies his statement. "I hold six jobs and keep too busy to sweat out the chopper service. Besides nothing bothers me—everything is just fine—no complaints—if you see what I mean," he chuckles. "I'm a career man—seventeen years of service. Of course, it's different with other men."

One of the towermen got so fed up with the irregular and late chopper flights that he wrote an anonymous letter to Sen. Richard Russell of Georgia. The senator started an investigation, the Air Force typists got writer's cramp, and official correspondence channels became clogged. But when the paper storm abated, the H-21s went on as before and the towermen kept sweating out the erratic shuttle service.

This anonymous gripe was an isolated case—in general, the towermen sometimes grin, and always bear it. When the chopper is late, they crowd the tower lookouts—go "bird-watching" as Sergeant Ayers calls it. Most of

(Continued on page 67)

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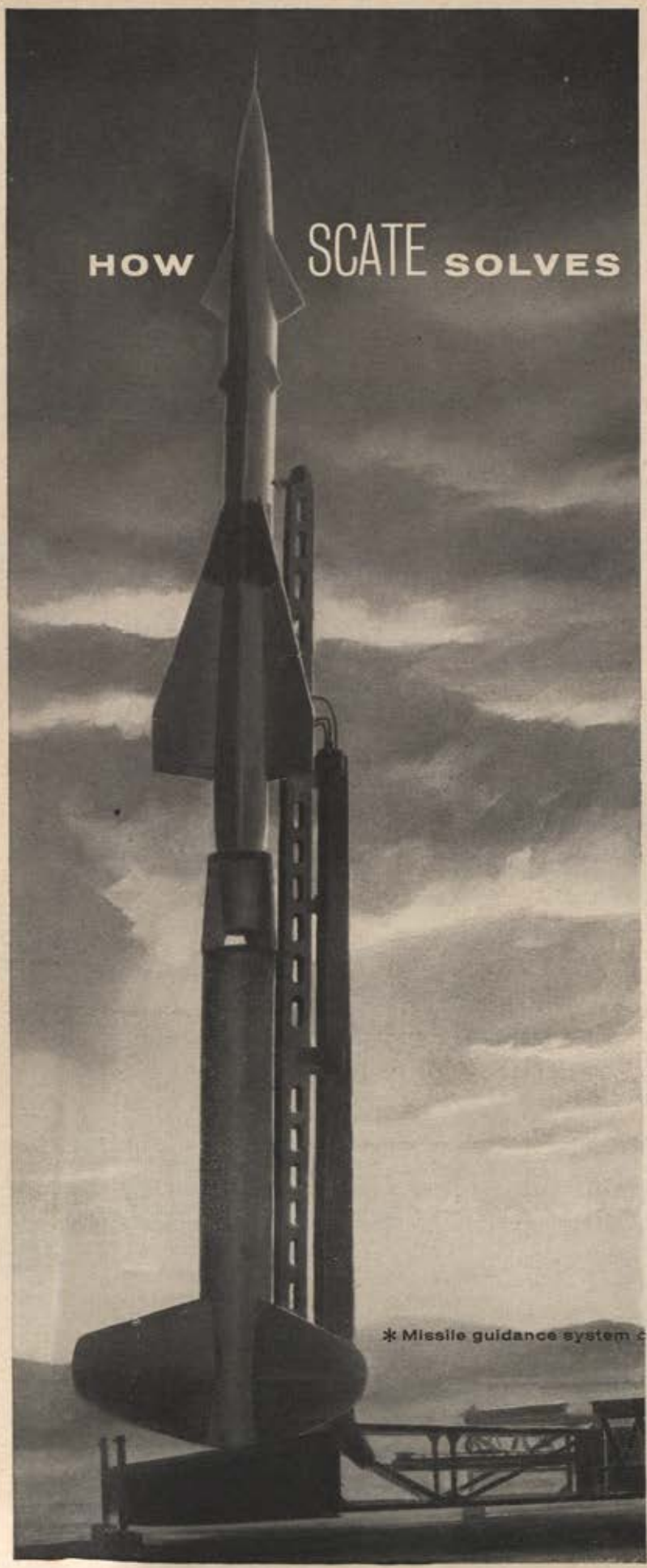

HOW SCATE SOLVES 2 BASIC PROBLEMS in testing electronic systems

Many complex electronic systems—missile guidance is a good example—may require testing that takes days by conventional methods. Yet the end function of such a system may last only a few minutes—**even seconds.**

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them don't mind waiting for the delayed trip ashore, but all agree that the irregular mail is tough on the nerves.

Take A/2C Donald J. Butler, a young radar maintenance man, for example. "I have a girl back in Charlotte, N. C.," he says. "Being so far away, letters from her mean a lot to me. When I get no mail for a couple of weeks, naturally I start to worry. Then the chopper comes and instead of mail it brings spare parts—it's a heartbreak."

A heartbreak for one towerman can become a real headache for another. Once, the weather was so bad that tower two was without mail for three weeks. When the chopper finally brought it, S/Sgt. Lawrence L. Barto discovered that his liability insurance had lapsed and his wife was driving the uninsured car. "Thank God, nothing happened," he says, "but it could have. And now when the mail is late, I can't help sweating."

The most common worry of the "bird-watching" towermen, however, is the dollars-and-cents side of the late mail. Living in our installment-plan society requires a good credit rating—something which the towermen find very hard to maintain. "Try to explain to the bank the reason for your late payment is that the helicopter was weathered in," says M/Sgt. Bill Gross of tower three. "Why, it sounds like an airborne version of the old cock-and-bull story. And after a while, your credit isn't worth a plugged nickel."

Although they sweat out the weather that grounds their choppers, the towermen don't seem to worry about flying over water. Says a tower scopeman, "If those pilots can take it, I can, too. Besides, when my tour is up, I'm ready to swim that 100 miles to shore." Then he reflects, "Of course, coming to the tower is different. But then, we've all gone through the survival school and we wear exposure suits."

Lest you think that the towermen are a bunch of cry-babies, listen again to Lieutenant Stetkiewicz: "Naturally, we first depend on the helicopters for critical radar parts which keep the towers from going ROCP (radar out of commission for parts). But just as important is the morale of the crews out there. They're doing an exacting job. If they have to overstay their tour or worry about their families when the mail is late, they can't do their jobs efficiently. And doing a good job on the towers is imperative."

Already critical, the helicopter situation is aggravated by the growth of the Texas tower setup. "We certainly need better helicopters," says Lieutenant Stetkiewicz. "We are rapidly outgrowing their present capability."

An informal meeting at 'copter operations. Seated is the commander of Towers' Support Helicopter section, Maj. Wilbur E. Parker, with officers of the group.

There are two things that could be done to improve the tower helicopter support capability and, of course, their flying safety. One has already been proposed by the Vertol Aircraft Corporation, makers of the H-21. This would involve a retrofit of the existing equipment with two turbines. The modified chopper would also get metal blades, auto-stabilizer, and an improved instrument panel, all of which would make it into an all-weather bird.

This life-insurance retrofit would take eleven months from the go-ahead, and it would cost about $770,000 for the six birds. However, the H-21s are getting on in years, and the modifications would only be an expensive patch-up job.

"What we need is new equipment," says Col. Richard DaVania, wing commander at Otis. "Sure, we've had a perfect safety record, but you can't fly over water on one engine without getting wet sometime. The law of averages is bound to catch up with us unless we get twin-engine helicopters."

The only new helicopter that would fill the bill for a better and safer support mission is the Vertol 107. In fact, the V-107 could actually save Uncle Sam a dollar or two. While the operating cost of the H-21 is 27.9 cents per ton/mile, the new bird would do the same job at 13.8 cents.

The V-107 is a twin-turbine chopper, faster and capable of flying on instruments. In an emergency, it would take to the water like a duck—it's been built for amphibious operations.

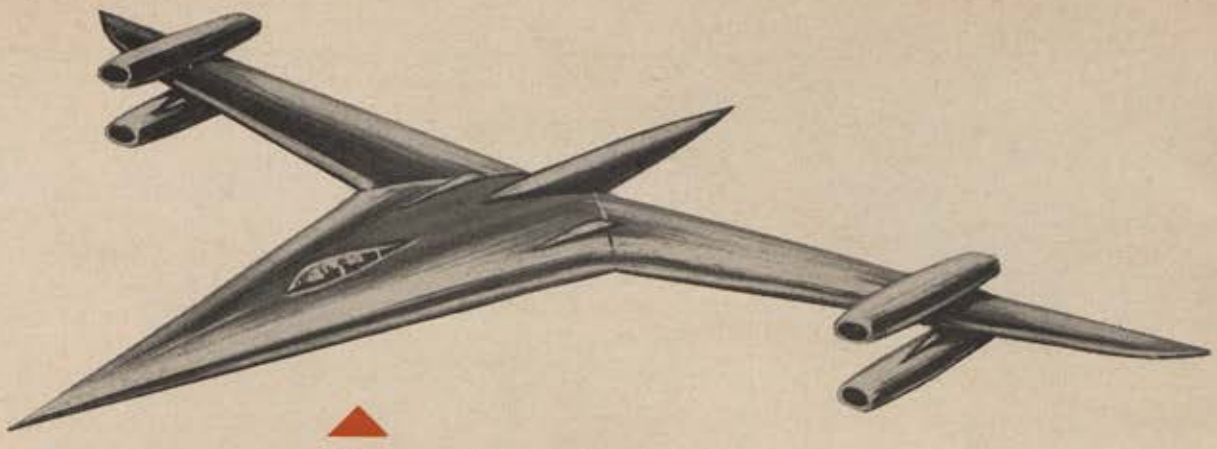
Mention this bird to the tower chopper pilots and they react like thirsty nomads at a desert oasis. And the bird-watching towermen? They don't give a bent rotor whether it's a V-107 or 701-V, so long as they get regular mail and get ashore on schedule, rain or shine.

Vertol test pilots are already putting the V-107 prototype through its paces, and apparently the super-chopper is every bolt as good as expected. The Army is negotiating for a quantity of the production model, and if the Air Force orders them too, the tower helicopter pilots would get the break of their lives and the towermen —an unbreakable lifeline.

Meanwhile, the fourteen pilots fly their crossed-fingers missions. Maybe they don't rate a listing in the base phone directory, but they certainly rate high with the marooned towermen. Says Sergeant Gross: "The chopper pilots? They don't come any better. And the job they are doing—we all know it's more guts than glory."—END

ABOUT THE AUTHOR

AIR FORCE *readers will find the name of Michael Gladych more than familiar. He is an aviation writer who, when he completes a story, has absorbed enough background to practically qualify him for some of the jobs he describes. A veteran airman himself, he served in the air forces of no less than four nations—his native Poland, France, Britain, and the US. His credo as an aviation writer is: "I'm too old to be a jet jockey, so I try to do the next best thing—write about airpower." Mike lives not far from the scene of this story, Hyannis Port, Mass.*



Above, artist's conception of the Barnes Wallis Swallow as it would look in its straight-wing configuration for low-speed flight. Note that the podded turbojets are parallel to the center line of the aircraft. Weapons would likely be carried in the extended tail cone that forms the back of the body.

British Polymorphic Design

SWALLOW CHANGES SHAPE IN FLIGHT

Dr. Barnes Wallis, Chief of Aeronautical Research and Development, Vickers-Armstrongs Ltd.

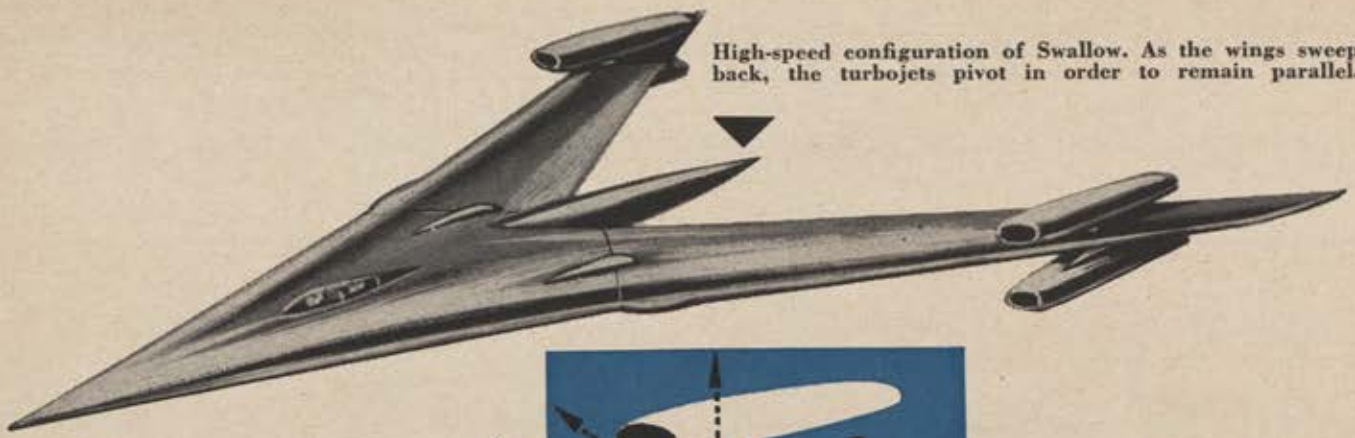
AN AIRPLANE which changes shape in flight to meet the conflicting aerodynamic requirements of high supersonic cruising speeds and low takeoff and landing speeds, has been designed in Britain, and has been the subject of a searching appraisal by top officials of the Department of Defense and members of the USAF. The polymorphic (variable shape) craft, named Swallow, is designed to cruise at speeds of about Mach 2.5 over ranges of many thousand miles. It could be developed as both a strategic bomber and an ultra-long-range transport.

A radical advance in aeronautical approaches, the Swallow is the brainchild of Dr. Barnes Wallis, famed British aircraft designer, the man who conceived and invented the bouncing bomb with which the RAF burst three of Germany's greatest dams in one night during World War II, flooding factories and mines in the industrial Ruhr.

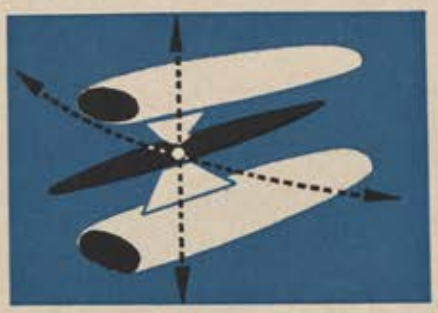
Dr. Wallis is Chief of Aeronautical Research and Development at Vickers-Armstrongs Aircraft, and he has worked on the Swallow project for more than seven years. British government financial support for the research work was withdrawn last year, after the controversial decision for Britain to stop developing manned supersonic bombers and to rely solely on ballistic missiles to mount the deterrent after present-day bombers become obsolete. This premature faith in the efficacy of missiles has been heavily debated by strategists and technicians in both Britain and the United States. Under present ground rules it appears that only American support is likely to save Dr. Wallis' advanced idea from extinction. The British government, uninterested in a new generation of manned bombers, promises only limited support for civil aeronautical research, and is unlikely to supply the $250 million to $300 million development costs necessary to turn the Swallow project from drawings, radio-controlled flying test models, and ground test rigs into actual full-scale hardware.

Vickers-Armstrongs' faith in Swallow is so strong that the company has continued with basic research after losing official backing, using its own funds, but it is doubtful whether the company has the resources to complete the job without outside support. It has been reported, however, that the company is building a small-scale development aircraft to prove Swallow's principles.

The Swallow will be an efficient aircraft, with a very



High-speed configuration of Swallow. As the wings sweep back, the turbojets pivot in order to remain parallel.



Cut shows how Swallow's engine pods pivot in both the horizontal and vertical planes. Horizontal pivoting enables pods to stay parallel to the aircraft. Vertical pivoting provides variable-thrust direction for control.

By Robert R. Rodwell

long range, because it is the optimum shape for efficiency at its cruising speeds, about 1,700 mph at altitude. Utilizing the optimum aerodynamic shape for its cruising speeds, it will be unlike the high subsonic bombers and transports of today, which are, without exception, compromises between the requirements of flight at, say, Mach 0.9 in the cruise, and Mach 0.2 when taking off and landing. As it is obviously undesirable for takeoff and landing speeds to increase very much over their present figures, any increase at the upper end of the speed range must not be accompanied by a rise at the lower end. The speed range, in fact, must be *widened.*

To do this, Dr. Wallis has abandoned the idea of a single shape, compromising airframe. Instead, he has evolved an airplane which can be straight-winged and efficient on takeoff, at comparatively low speeds, and which changes shape in flight to become an acutely swept delta-wing machine. The acute delta form gives a good lift/drag ratio at speeds over Mach 2, and in the Swallow the efficiency is further improved by "nicking" the delta form. The inner and rearward area of the triangle, which contributes drag but little effective lift, is cut away. The "wetted" area is further reduced, and therefore drag through skin friction is reduced, by integrating the fuselage and the wing; there is no fuselage in the accepted sense of the word.

Such an acutely swept, thin wing, efficient at high speeds, has very poor lifting qualities at low speeds, and even these only at impossibly high angles of attack, which impair pilot vision during the landing and takeoff. The wings of the Swallow, therefore, pivot forward, on a joint not unlike the human hip joint, and they become unswept, high-aspect-ratio wings which give a good lift/drag ratio at low speeds. This is because it is the leading edge of an airfoil which performs most of the useful work, and the more length of it you can present to the airstream, while still keeping the wetted area low, the more favorable lift/drag ratio you get. Because of the low-speed efficiency of the Swallow, it will lift greater loads, for a given airframe weight, than less efficient airplanes. By using most of this lifting capacity for fuel, Swallow attains its great range. Cruising economy in the high-speed regime, where the lift/drag ratio will be on the order of ten to one, leads to a further enhancement of the range.

The pivoting wings suggest that differential sweep could be used as a means of control, but in fact, variation of engine thrust direction is the method proposed for the Swallow. The podded engines are mounted on pivots, and can be moved in both the vertical and horizontal planes, as the accompanying diagram shows, for control of climb, dive, and yaw.

This mode of control is acceptable during cruising flight, but it means that plenty of power must be maintained during the landing phase if control is to be retained. And this in turn may lead to excessive landing speeds, so it is possible that there is a different control system, using conventional elevons, for use in the low-speed configuration. Rudder area in this configuration would probably be the side area of the engine pods, and there is a suggestion that the pods are slab-sided for this reason.

The movement forward of large parts of the airframe for low-speed flight brings with it severe problems of center-of-gravity shift, but it seems that the aerodynamic design is such that the forward shift of the center of gravity is counteracted by the equally inevitable shift forward of the center of pressure. The volume of the center body is small because it is integrated with the wing, and what little capacity there is accommodates crew, electronics, and the wing pivot mechanism. The logical place for bomb or missile stowage, therefore, seems to be the extended tail cone of the center body, where there are no conflicting space demands, and which would be right for center-of-gravity considerations. An alternative method would be a weapons pod below the center body, similar to that of the B-58 Hustler. This solution would give operational versatility, simply by changing the pod. In a transport development, it is not inconceivable that the passengers themselves might be carried in pods.

Sustained flight at Mach 2.5 raises the question of kinetic heating, but this problem too has received the attention of Dr. Wallis, and has been solved by that gifted man. Reported to be no less an advance in its field than the polymorph is in aerodynamics, the Wallis method uses a vacuum between an outer heat-resistant envelope (possibly ceramic, or cobalt steel) at the hotspots, notably the nose and leading edges, and the main load-bearing structure.

There has been no official release of information on the Swallow at this writing (early August), and the way in

(Continued on page 71)

TOUCHDOWN...*EVERY THIRTY SECONDS*

The weather has closed in. You peer out the window and see nothing–perhaps not even the wingtip.

"We will land in 12 minutes"

The Captain's reassuring words come over the intercom. "We will land in 12 minutes."

Now you are being brought down in easy stages – safely – over the Outer Marker Beacon . . . the Middle Marker . . . the Inner Marker . . . then *touchdown* . . . on the runway.

Every 30 seconds, somewhere in the free world, a plane is landed safely by "ILS," the Instrument Landing System developed by ITT, and installed in every major airport here and abroad.

Air passengers relax – pilots too!

Air passengers everywhere know this feeling of security.

The pilot likes it too. Because he controls the landing at all times. Once he is on the glide-path he needs no further instructions – nothing except the electronic information he sees before him on the instrument panel, and the meaningful "beeps" in his earphones.

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ITT has long been a pioneer in radio aids to air navigation. ITT laboratories developed the first radio compass. The first distance-measuring equipment. For the Navy and the Air Force they developed TACAN (Tactical Air Navigation), the system that gives military aircraft their pinpoint position–at every instant of flight.

Last year the Civil Aeronautics Administration accepted VORTAC–an application of TACAN for all civil aircraft. The CAA has awarded to ITT the contract to build 132 VORTAC ground stations throughout the U.S. Thanks to VORTAC the nation's airways will soon be ready for the fastest jet transports.

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which the existence of the project became known created a furor in Britain. The first mention came in questions asked in the House of Commons by a Conservative (Government) member, who obviously was aware of its existence, and who asked why the government was not doing something about it. So well did he keep his questions within the bounds of "security," however, that their significance was overlooked by all publications with the exception of one specialized British aeronautical magazine, which published an article discussing polymorphic aircraft in general terms, but going no further than the Members of Parliament had in giving away hard fact.

The public revelation came on May 9, when a major British newspaper, with information from some unspecified source, published a front-page, banner-headline story about it, with an artist's impression. The paper had presumably recognized the significance of Swallow in the light of a controversial RAF public-relations exercise earlier that week, at which the air chiefs let it be known, in no uncertain terms, that they wanted more manned airplanes. After the first revelation, all the other newspapers were onto it; questions were asked in the House of Commons, there came a statement from the Minister of Supply that "action [against the *Daily Express*, the newspaper involved] was being contemplated," and there were dark rumors of writs being threatened against newspapers and technical press writers, and even against Dr. Wallis himself, for breaches of the Official Secrets Act.

British Members of Parliament have been loath to let the subject be dropped since then, and recent questions in the House of Commons have received the answer that

Map shows how Alaskan-based Swallow could mount omnidirectional threat against Communist bloc, either by flying standing patrol or by evasive-track approaches.

"alternative proposals, embodying the principle of variable geometry are being examined." During the height of the uproar in Britain, a US mission, headed by Assistant Secretary of the Air Force for Research and Development Richard Horner, was at Vickers-Armstrongs investigating the work that has been done on the polymorphic airplane, to decide whether its development should be continued under the Mutual Weapons Development Program. The decision of Secretary Horner's team is still awaited.

Doubtless members of the mission realize the Swallow's strategic implications. A polymorphic bomber, as proposed by Dr. Wallis, with a cruising speed of Mach 2.5 and an endurance of eight or nine hours, operating from a base in Alaska, could fly an evasive track to any point in the Communist world and return to base without refueling. As a missile-launching platform—the concept represented by the B-52G, now being built—standing patrols could be mounted, around almost all of the vast Red periphery, to pose an ever-present omnidirection threat *(see map)*.

With such an aircraft, SAC would have to rely less on overseas bases, in possibly politically unreliable territories, for the deterrent could be mounted using bases on American territory alone, or in Greenland. In air transport the polymorphic aircraft would have an equally radical effect, for with the speed and endurance quoted, it could fly from Britain to Australia, over water all the way, around South Africa, and it would infringe no national airspaces in doing so. This is the British Commonwealth's lifeline route, and with the seemingly never-ending loss of overseas staging posts and over-flying rights—Iraq is the latest example—such an aircraft may someday be a necessity to operate it. There are similar routes of vital strategic importance to the US, on which the polymorph's operational independence would be of great value, too.—END

USAF's Variable-Sweepback Research

The USAF is not without experience in variable-sweepback aircraft. The X-5 was ordered in 1949 from Bell Aircraft as a single-seat monoplane to investigate the aerodynamic effects of changing the degree of wing sweepback in flight. Photo shows limits of X-5's sweepback—from 20° to 60°. Powered by an Allison J-35-17 turbojet, the X-5 "Flying Guppy" could fly 550 mph. Tests were flown in it by USAF and NACA. One of the two X-5s built crashed in 1953, and the other has recently been turned over to the AF Central Museum, at Wright-Patterson AFB, Ohio. From the X-5 program the Air Force learned lessons that have been applied in the design of some of today's fighters.

ABOUT THE AUTHOR

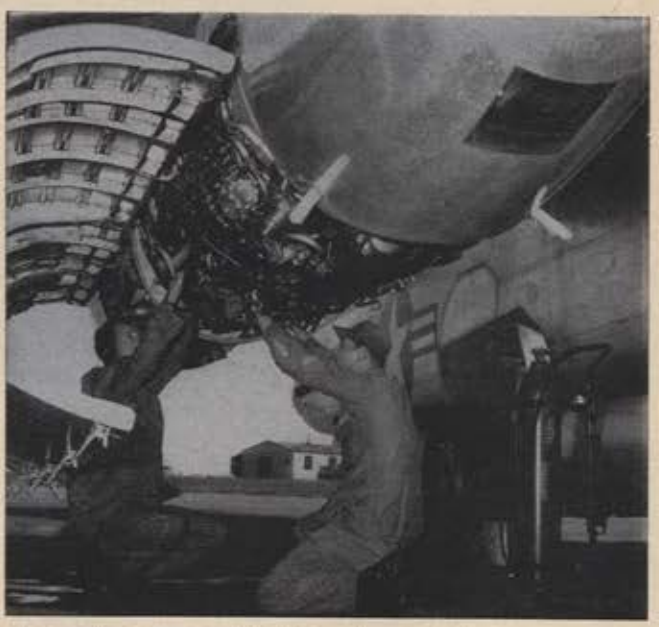
Robert R. Rodwell, staff writer for the British magazine Aeronautics, *makes it his daily business to keep up with the latest trends in military aviation. A "Mach Buster" who's flown the F-100, he will be remembered for his graphic account of Britain's V-Force as partners of our own SAC, in our June '58 issue. Photo shows him dressed for ride in a UK Valiant.*

B-66 Destroyers

VERSATILE STRIKE FORCE IN ENGLAND

USAF crewmen ready for a B-66 flight as the versatile craft looms over them on the base at Sculthorpe, England.

Navigator Capt. Frank Houpt, gunner A/2C Marion Johnson, pilot Capt. William McLamore make inspection of their gear.



Final adjustment on B-66B engine is made prior to take-off. It is said to be the fastest American tactical bomber.

SCULTHORPE, ENGLAND

USAF's 47th Bombardment Wing, Tactical, is the only assault force now in the NATO inventory that can strike behind the Iron Curtain at any hour, in any weather. The Douglas B-66B Destroyer, now in full operation from this RAF base not far from the famous British port of Hull on the North Sea, is an electronic marvel. It can reach its target without reliance on ground-based equipment.

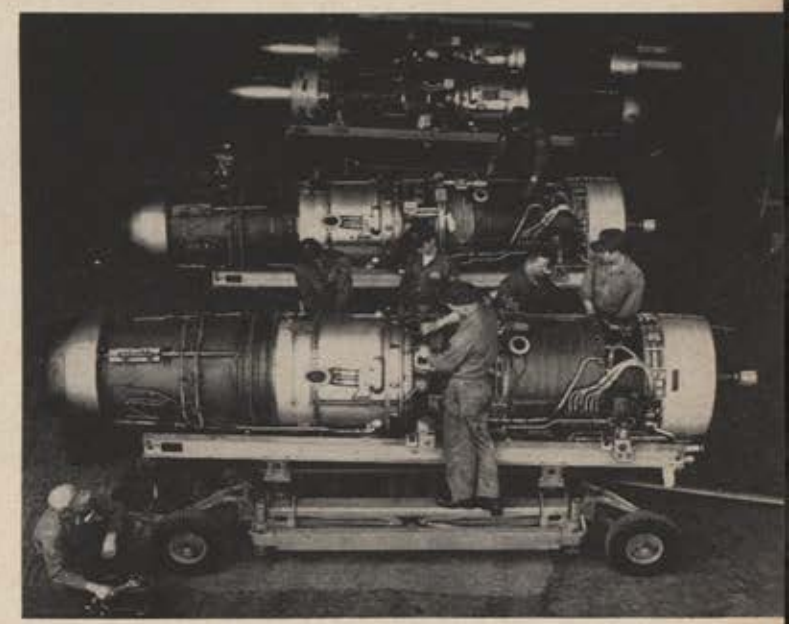
Col. R. J. Clizbe, commander of the 47th, today has his eye on the Middle East, preparing for the possibility that his unit may be called on to demonstrate its mobility and speedy reaction time in that area. Details he will not discuss, but his mission is retaliatory and fully integrated with plans of the Strategic Air Command. With the increased emphasis now being placed on Russian defensive capabilities, it is obvious that a tactical bomber with the B-66B's range, speed, refueling capability, and advanced radar could clear the path for SAC's bigger bombers.

The 47th is the only B-66 wing in USAF. It also is the only USAF all-weather tactical bomb wing in Europe, boasting capabilities far beyond those of our best fighters and fighter-bombers.

In the "lag" that lies ahead, where the Reds are making SAC's job

Versatile and deadly, the B-66 cruises in English skies, a vital aid in the deterrent inventory of NATO weaponry.

Planning a flight for the B-66, crewmen carefully go over the charts that will guide their readiness mission.



Power for peace. Squadron maintenance men go over every component of the Destroyers' engines prior to installation.

tougher while we wait for the ballistic missile to live up to its advance billing, the 47th and its B-66Bs could play a vital role. The unit is kept combat-ready and flies regular training missions over much of the European continent. Installation of Thor IRBM sites in England, scheduled to begin late this year, will supplement but not replace the 47th's effort,

Performance of the B-66B is comparable to that of the Century series fighters now coming into the NATO inventory at a substantial rate. Rated in the 600- to 700-mph class, it can make bombing runs at supersonic speed. It is powered by two Allison J-71s. Gross weight is 78,000 pounds.

The three-man crew is carried in a pressurized and air-conditioned compartment with access through the floor. There are two 20-mm. guns in the tail, operated by a General Electric electronic fire-control system.

While the B-66B is not equipped with an air-to-ground missile, such as the Rascal or Hound Dog that will be used by SAC bombers, this capability could be added. Just as important, however, is the constant improvement of its electronic features, which can be modified to meet new challenges in the environment our forces would expect to meet over enemy territory.

—Claude Witze

De Havilland Otter Amphibians For Search and Rescue

Emergency evacuation from a tiny lake in the wilderness to a waiting ambulance hundreds of miles away is a simple chore for the Otter Amphibian.

R.C.A.F. Search and Rescue Otter Amphibians are playing a dramatic role in civil and military operations within our Northern Air Defence areas.

THE Otter

58-7

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THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED

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Air Force cadet with Academy mascot, falcon named Mach I.

USAF ACADEMY

On the Eve of the Move

In all of the recent controversy over the US Air Force Academy, outside Colorado Springs, Colo. (see "Airpower in the News," page 26), *the public has been told about a good many unsubstantiated charges that the new school is an extravagance, that it will cost $300 million and be equipped by the taxpayers with lavish golf courses and full air conditioning. All of these statements are false. Col. Albert E. Stoltz, Director of the Air Force Academy Construction Agency, gave the basic facts to the press at a conference in Colorado Springs on August 1. Here are excerpts from what he said:*

THE AIR Force Academy Construction Agency is charged with supervision of planning, designing, and construction. The Agency is a field extension of the Office of the Director of Installations at US Air Force Headquarters. Our primary job is to see that the Academy is built—soundly, properly, and within the limitations imposed by the people, through Congress, and by our superiors in the Air Force chain of command.

The Construction Agency has been at work since June 4, 1954—three weeks before the site north of Colorado Springs was chosen over 400 competing locations to be the permanent home of the Academy. Our major functions are to conduct contract administration, prepare planning and design directives, review working plans and specifications, and supervise the inspection of construction work. We are organized as a typical military staff office, with five principal divisions: engineering, operations, contracting, administration, and comptroller. We have a staff of 159 persons, of whom 134 are civilians and twenty-five Air Force personnel. The Agency includes experts and specialists in a host of diversified technical fields, ranging all the way from master planning to cost accounting.

The construction work to which all our attention is being directed is located at the base of the Rampart Range of the Rocky Mountains. The Academy site covers a 17,800-acre area, only about 10,000 acres of which are economically "buildable" because of steep slopes, hills, and soil conditions that would make construction costly. About 4,500 workers representing nearly all trades and crafts are on the job. At one time, the work force exceeded 5,000. Approximately eighty-nine prime construction contracts have been awarded to date, and these prime contractors have engaged about 450 subcontractors to assist them. Almost 15,000,000 cubic yards of dirt have been moved for the building job. Involved in the over-all program are more than 4,000,000 square feet of enclosed floor area and 800,000 cubic yards of concrete.

The Air Force Academy's sister institutions, West Point and Annapolis, are 156 and 113 years old, respectively. They have been built piece by piece over more than a century. But the Air Force Academy will be substantially completed in less than five years from the time Congress and the President authorized its creation.

Today, approximately $94.5 million worth of the $114 million authorized for "pure construction" is completed. That represents 83.4 percent of the building we are authorized to do. All told, $133.5 million has been set aside for the Academy construction project, $19.5 million of which is for planning, designing, land acquisition, and other nonbuilding items. The construction itself is being done within the $114 million authorization. What additional funds become available for deferred projects will depend, of course, upon congressional appropriations in future years. These projects might possibly include, among others, the airfield, fieldhouse, obstacle courses, target

(Continued on following page)

Air Force Academy, one month before cadets' moving-day. This view is looking northwest, toward the Rampart Range.

A typical dormitory room. The two-man rooms are both functional and modern, were planned for long-range economy.

ranges, pedestrian walkways, parking areas, and the like.

During the past year construction work has progressed at the rate of nearly $5.7 million worth a month, on the average. Fifty-three major building contracts are completed already, and fourteen more will be before or immediately after our opening day target, September 2. The construction race is in its final lap, and we are on the way to setting what may well be a peacetime record for a project of this magnitude and complexity.

On August 29, the entire cadet wing of 1,160 future Air Force leaders will commence moving from the interim site at Lowry Air Force Base near Denver to the permanent site.

The Academy is being built for a cadet enrollment of more than 2,500. A good deal of work still remains to be done—but it is not priority work essential to commencement of the Academy operation. The directive we followed was to accomplish one major objective by September 1958—the completion of enough facilities to permit the opening. However, the Academy is not at this point a finished product, and we certainly do not pretend that it is. It has not been a requirement to have all building done by opening day, but only the minimum essentials necessary to begin operations.

Where exactly will we stand in construction when this momentous move is made? Scores of significant contracts already are completed. They include buildings of various types, utilities, landscaping, roads, bridges, grading, drainage, planting, irrigation, and many other projects. Also ready for use by opening day will be the three perhaps most vital buildings of all—the buildings where the cadets will live, study, and dine. The quarters, containing 1,320 two-man rooms, extend for one-quarter of a mile across the northern segment of the academic area, which is located on a broad natural mesa in the northwest portion of the site. Near the quarters building is the academic complex, including the library and full classroom and laboratory facilities. Also nearby is the 3,000-man, block-square cadet dining hall. The quarters are ninety-eight percent completed, the academic complex is ninety-four percent done, and the dining hall is virtually finished.

Other structures in the academic area are the administration building, now seventy-three percent completed; the cadet physical education complex, forty-five percent; the cadet social center and theater, thirty-five percent; and the planetarium, seventy-nine percent. All of these, except the social center, are to be finished next March. The celebrated tri-faith chapel will be built under a contract expected to be awarded in September.

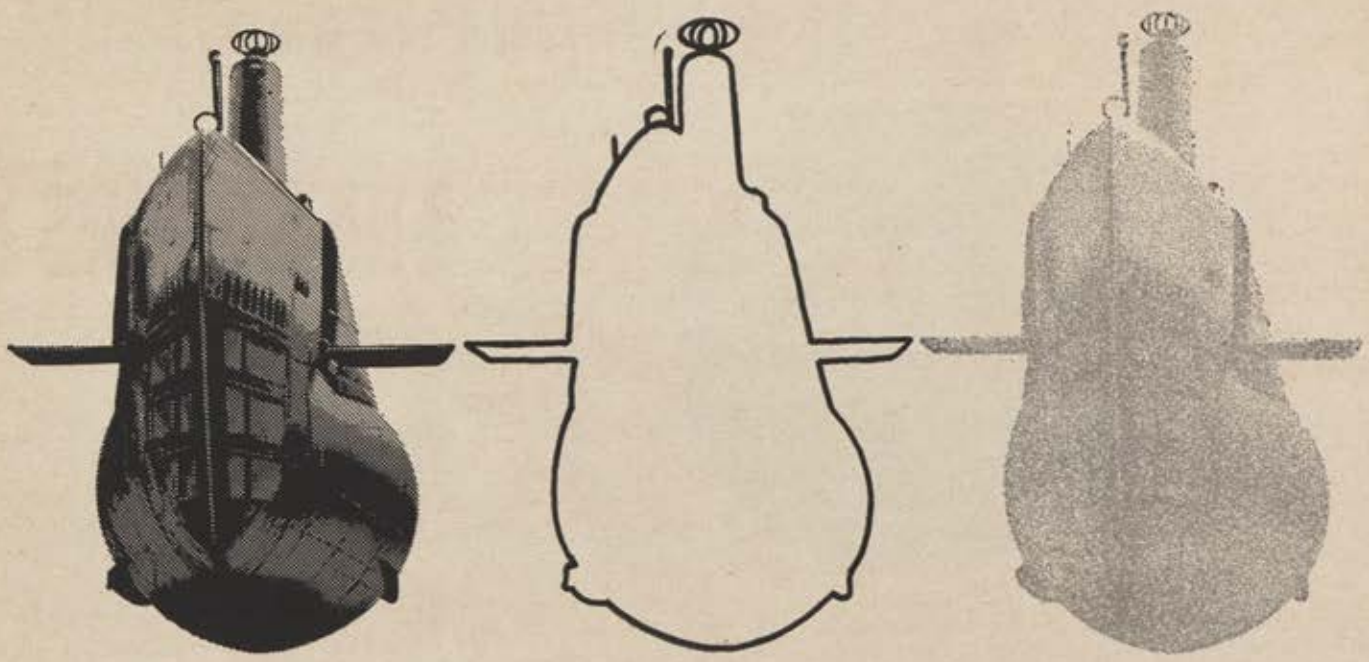
East of this academic area will be the parade and drill field. In a valley to the north will be the athletic fields and physical education complex. A ridge separates the athletic fields from the proposed cadet maneuver area, which is to contain small-arms ranges and an area for maneuvers. A valley to the southeast of the academic area is set aside for a golf course, being donated by the Air Force Academy Foundation. The Foundation is a nonprofit corporation organized by private citizens to provide the Academy with facilities for which funds are not appropriated by the government.

The mesa to the south of the golf course is the site for the hospital, on which construction has not yet begun, and for bachelor and visiting officers' quarters and the Academy staff club. Douglass Valley, south of the hospital mesa, will contain housing for officers and airmen assigned to Academy duty and their families. Forty-four of these homes were built with public funds. But 550 others in Douglass and 650 in Pine Valley, south of Douglass, are to be built through the privately financed Title VIII (or Capehart) plan, under which military occupants of the houses pay off twenty-five-year mortgages with their standard rental allowances.

A broad mesa south of Douglass Valley and north of Pine is the site of the community center, with complete shopping facilities and support-personnel dormitories, a support-personnel dining hall, and a physical education building. A junior-senior high school will be constructed in Pine Valley, and elementary schools will be built in both Douglass and Pine. These schools will not be built with Academy construction funds. The service and supply area, which already is in operation, and the prospective airstrip are placed east of the housing area. A donated football stadium would be just west of the principal north-south thoroughfare at the lower end of Douglass Valley.

We believe that the Air Force Academy will be as great a source of national pride as its graduates.— END

in antisubmarine warfare, it has to be . . .



YES or NO . . . not MAYBE!

radar

sonar

magnetic

other

It takes a lot of faith in your radar, sonar and/or magnetic detection equipment to leave an area with a "clean" stamp . . . even more faith than it takes to believe the blip that shouts "sub below." Such confidence-building equipments are not developed overnight . . . indeed, the technology spawning this gear at Texas Instruments dates back nearly thirty years to similar techniques in pinpointing subsurface mineral wealth. Since its entry into this complex field, TI has supplied literally thousands of detectors to the free world's navies . . . *operational* means of locating, tracking, and triggering counter-attacks against the subs that swim the sea.

For detailed information on operational as well as advanced ASW gear now under development, properly cleared military or industrial personnel write or wire for appointments to: SERVICE ENGINEERING . . .

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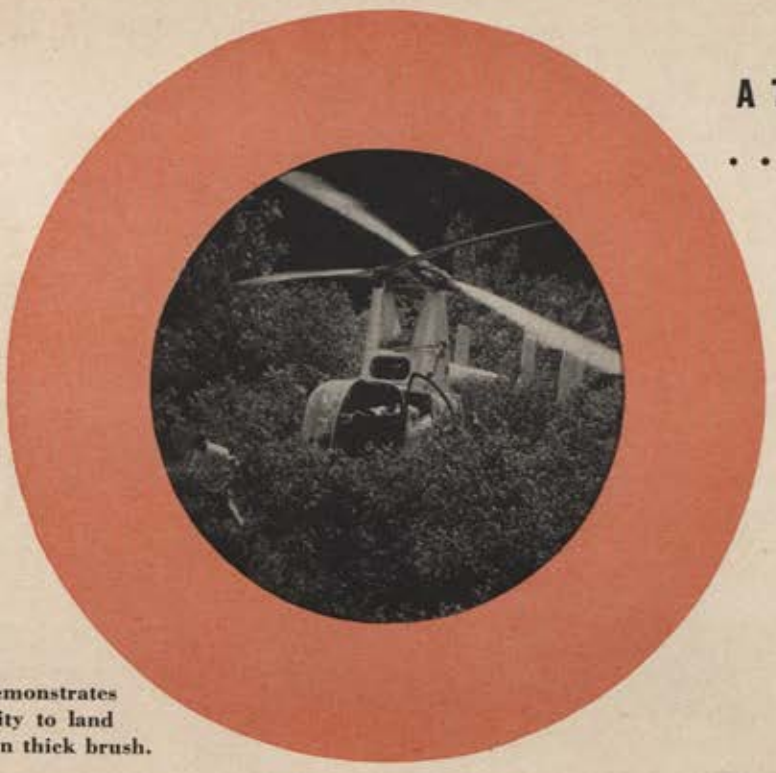
A TECH TALK Feature



H-43 demonstrates its ability to land safely in thick brush.

LIFESAVERS a new flavor

EFFECTIVE short-range rescue operations are measured in the minutes and seconds it takes to reach the scene of a downed aircraft and take immediate action.

A few well-trained men and a few pieces of light rescue equipment on hand quickly where a plane has crashed can do more lifesaving and fire fighting than later-arriving larger teams of base fire and medical personnel.

The Air Force's latest approach to the short-range crash-rescue problem is the Kaman H-43 helicopter. The H-43, chosen for this mission after careful study, now is going into service on round-the-clock, five-minute-standby alert, initially at continental USAF bases, eventually around the world.

Among the multiple capabilities of the Kaman chopper:

- It has good performance characteristics as a conventional helicopter and can operate under high temperature and wind conditions.
- It easily converts from a fire-fighting configuration to rescue and medical evacuation.
- It can rescue either by hoist or landing.
- It is small enough to get in and out of confined areas in rough terrain.
- Its radius of operations (seventy-five miles) is well suited to the incidence of military aircraft accidents (96.6 percent occur within sixty miles of an air base).

Two versions of the Kaman 'copter are on order. First off the line will be the piston-engine H-43A, powered by a Pratt & Whitney R-1340-43 Wasp engine. The following H-43B will be powered by a Lycoming T-53 gas turbine. Both are similar to the HUKs and HOKs, also built by Kaman, in use by the Marines and Navy.—END

The Kaman H-43's servo-flap control helps create positive three-axis stability.

H-43 pilot helps open path to flames by directing downwash from his blades.

Vought Vocabulary

re·lent′less: *inertial guidance keeps a Mach 2 bird locked on target for a nuclear strike*

When a target's latitude and longitude are marked on this missile's brain, an appointment has been made.

To keep its rendezvous, the Chance Vought *Regulus II* will launch stealthily from submarines – nuclear and conventional – from surface craft or mobile shore launchers. Its advanced inertial guidance will compensate for wind, weather and the earth's rotation. It will detour enemy strongpoints, outfox known counter-weapons, follow any one of a hundred trajectories. Closing in on its quarry, it can descend from over 60,000 feet to smokestack height to escape radar detection.

At Mach 2-plus, *Regulus II* can pierce over 1,000 miles of hostile sky in minutes to score a nuclear bull's-eye.

This relentless bird – in the air now – is the product of a pioneer missile team that provided the Navy with its first operational attack missile. *Regulus I* joined the Fleet in 1955. In a weapons field so new that its ranks are still forming, Chance Vought's backlog of working knowledge is exceptional.

CHANCE VOUGHT AIRCRAFT
INCORPORATED DALLAS, TEXAS

ZERO PLUS 3

The story of the coat hanger that saved a jet pilot

It happened during an H-bomb test near Eniwetok.

Air Force planes had to be at exact altitudes and distances before shot time. A special radar system permitted personnel of the command ship to identify each aircraft and check its position on the radar scopes.

The shot went off as planned, but when the shock wave hit the ship, it knocked out the special radar antenna high on the mast.

The Raytheon Field Engineer* on board went into action. He quickly fashioned an emergency antenna from a metal coat hanger, climbed the mast, and taped the antenna in place.

With the system working again, it was discovered that one pilot was flying in the reverse direction—out to sea. An Air Force officer reported that the prompt restoration of the special radar undoubtedly made it possible to save this pilot and his plane.

Raytheon Field Engineers work with the Armed Forces to keep electronic equipment in top operating condition. Their skills are another reason why Raytheon has earned its reputation for "Excellence in Electronics".

**Edward K. Doherr, now Asst. Mgr., Government Services Division.*

RAYTHEON

Excellence in Electronics

RAYTHEON MANUFACTURING COMPANY, Waltham, Mass.

The READY ROOM

RESERVE AND AIR GUARD NEWS

Air Force Association's **Reserve Forces Seminar and Workshop** will be held on **Thursday, September 25,** at the Baker Hotel in Dallas, in conjunction with this month's **AFA Convention.** The day's program will begin at 9 a.m. with opening remarks by **Assistant Secretary of the Air Force for Manpower, Personnel, and Reserve Forces, David S. Smith.** His remarks will be followed by an up-to-date report on legislative matters by **Rep. Overton Brooks** (D.-La.), Chairman of the Subcommittee for Reserve Forces of the House Armed Services Committee.

Other subjects of discussion during that day will be **civil defense requirements,** with **Lt. Gen. Clarence R. Huebner,** USA (Ret.), Director of Civil Defense for the State of New York, giving the principal address on this subject; **logistic requirements; air defense requirements;** and **spaceflight requirements,** which will include an address by **Dr. Paul Blasingame,** Colonel, USAF, and head of the Department of Astronautics, Air Force Academy.

The morning session of the Seminar will adjourn at 11:30 a.m. for an **Air Force Association-Reserve Forces Leaders' Luncheon.** The afternoon session will open at 2 p.m. with an address on **civic responsibilities** by Air Force Chief of Staff, **Gen. Curtis E. LeMay,** and the Air Force Association's **Annual Reserve Forces Awards** will be presented just prior to the 5 p.m. adjournment.

This year's Seminar and Workshop promise to provide the most productive agenda in AFA's history. More than **500 Air Reservists and Air Guardsmen** are expected to participate.

° ° °

The **Air Force Section 8033 Committee,** formerly Section 5, (the Secretary's Committee on Air Force Reserve and ANG Policy) was called to a **special emergency meeting** in Washington on July 31 and August 1. Discussed was an Air Staff proposal for the **development of flying status control measures** for nonactive-duty members of the Air Reserve Forces.

The Air Staff recommended: (1) **Automatic removal from flying status** for all nonactive-duty Reserve officers, effective January 1, 1959; (2) **Automatic suspension from flying status** of officers leaving active duty effective January 1, 1959; and (3) **Revalidation of flying status** prior to December 1, 1958, of those officers assigned to positions not requiring flying status.

This would result in the **screening of some 47,800 rated Air Force Reserve and Air National Guard officers** to determine those no longer proficient in flying. Those who have not kept themselves current would be **dropped from the rated rolls** but **not from the Reserve.** They could, however, be reinstated for a Reserve assignment calling for an aeronautical rating.

The Air Staff proposal met **considerable resistance** by the Section 8033 Committee, but it was finally recommended that **central flying evaluation boards be established** for Air National Guard and Air Force Reserve officers to determine flying potential of these officers. Also recommended was that **Reserve officers**—when called to active duty—**lose their flying status** if it is then determined that they have no potential as rated personnel. The Committee urged that the decision on the officer's rating be delayed until the officer actually gets placed in a job requiring flying status.

The retirement of Col. Bill Westlake, Executive Secretary of the AF Committee for Reserve Policy, became effective July 31. His replacement is Col. Russ Tarvin.

Another topic of urgent discussion by the Section 8033 Committee was the **135,000-man ceiling** placed on the number of Air Reservists who can be **in paid-training status.** The ceiling was established by the Department of Defense. The Committee strongly recommended that DOD raise the ceiling to the **required 208,000,** and also urged that **mobilization assignee positions be reviewed** with an eye to disbanding all positions not urgently required.

After hearing an Air Staff proposal that active-duty and nonactive-duty promotions **parallel each other,** the Committee went on record that the Air Staff should maintain promotion systems **as now established.**

° ° °

Retirement orders become effective July 31 for **Col. William "Bill" Westlake,** Executive Secretary of the Air Force Committee for Reserve Policy (*see cut*). A native of Chicago, Colonel Westlake began flying with the Army Air Service in 1918. He was an early barnstormer and became an aviation writer in 1919. He served as aviation editor of the Chicago *Daily Journal* for seventeen years. During World War II, he served as **Chief of Information** for Gen. H. H. "Hap" Arnold. After the war he served in various public relations positions with the Department of Defense and later in key Air Force positions in Europe and Turkey. The past four years, as **Executive Secretary to the Air Force Reserve Policy Committee,** Colonel Westlake has done much to attain Air Staff support of the Reserve program.

Colonel Westlake's replacement is **Col. Russell W. Tarvin** of Rocky Ford, Colo. A veteran Air Force pilot, public relations and business executive, Colonel Tarvin was recalled to active duty to fill this vital post. He previously spent twelve years in the Air Force. One of his principal assignments was **Information Services Officer for the Air Training Command.**

° ° °

"Vest-pocket orders" are going into effect with a newly published **Air Force regulation** permitting Air Reservists with mobilization assignments to report for active duty **within minutes after a major attack** on the nation. The orders authorize **travel at government expense** to the site of assignment. **Not authorized** are movement of household goods and transportation of dependents. Official public

(Continued on following page)

announcements would proclaim a national emergency, requiring full mobilization and authorizing the ordering of the Reservists concerned to active duty. Members of Reserve and Air National Guard combat units **will not be issued these orders** since they are scheduled to be **called up as a unit.**

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H.R. 12304 and S. 3240, comparable bills to amend ROPA (*see "The Ready Room," July '58*), are still **awaiting action** by the House and Senate Armed Services Committees. Since hearings have not yet been scheduled and since the **Department of Defense Omnibus Amendment to ROPA** is still being studied by the Bureau of the Budget, hope for action on any ROPA amendment this session appears dim.

• • •

The **immediacy of the ROPA problem** was underscored last month by **Reserve Brig. Gen. Ramsay Potts** while on active duty at Grenier AFB, N. H., with his **459th Troop Carrier Wing,** and **Reserve Brig. Gen. Charles Sweeney,** on summer duty at Otis AFB, Mass., with his **104th Fighter-Interceptor Wing.** With **Lt. Gen. William E. Hall,** CONAC Commander, as host, a group of key officers from Headquarters USAF visited the two units during their summer training encampments. The guests returned to Washington **highly impressed** with the **Reserve Forces' capabilities,** pointing out that if many experienced officers were to remain with the units, **immediate action to amend ROPA was absolutely necessary.**

• • •

Sen. Richard B. Russell (D.-Ga.), Chairman of the Senate Armed Services Committee, recently introduced **S. 4199,** a bill to provide **active-duty agreements for Reserve officers.** At this writing, however, a probable mid-August adjournment of Congress appeared likely to **prevent hearings on the bill** until next session.

• • •

Reservists facing the **possibility of being involuntarily released from active duty** after completing **at least five years of continuous service** received **some encouragement** last month when the House passed a bill providing **two months' basic pay** for each year, in the grade in which the Reservist was serving at the time of release from active duty, ending at the close of the eighteenth year—not to exceed a total of two years' basic pay at that grade. The bill has been **under discussion for many months** and still must pass the Senate.

—By the Staff

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Photograph by Howard Zief

HELP STRENGTHEN AMERICA'S PEACE POWER

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DURING the early years of World War II, I was stationed at Steeple Morden Aerodrome in Hertfordshire, England, where I had charge of flying control for a Royal Air Force training squadron of the Bomber Command. Two miles away American airmen operating B-17 Flying Fortresses were based at the RAF station at Bassingbourne. Part of my job was to advise American flying control personnel on British methods of control. At the time, the Americans were flying by day only on high-level raids, while the British did their bombing at night, in accordance with agreed Allied strategy. I soon became friendly with my opposite numbers at Bassingbourne and because I showed great interest in their daylight "ops," I was asked over one day to witness the takeoff for a raid. A few mornings later I made my way over to Bassingbourne.

Watching the takeoff, I was mystified by the way the B-17s—rising as a scattered flock—suddenly finished as a perfect formation. I had seen colored lights being dropped from one or more aircraft—obviously these were signals—but they did not seem to have anything to do with the directions in which the aircraft were flying. At any rate, somehow, minutes passed and sure enough, these big fellows attained formation and set course for Europe.

I remember saying to one of the American duty controllers, "How on earth your pilots get into formation beats me completely. I just can't figure it out." He smiled and said, "Well, here's your chance. Step on the porch and watch the proceedings from there, and see if you can find the answer."

From the doorway, watching the Forts lining up, I was astonished to see crowds of airmen lining the runway, actually on the edge of the concrete, something unheard of at RAF stations. I asked what they were doing, and was told, "Oh, they're going to cheer off the aircraft, and they'll be there again to welcome them home."

I was astonished. In RAF Bomber Command, our takeoffs were nearly always at night, and no one was allowed on the airfield unless they were on duty.

The takeoff continued. As the first B-17 turned onto the end of the runway, it was easy to see it gain speed.

Its ground crew vigorously waved hats and hands as it passed them.

As each aircraft came thundering down the runway, its ground crew could be seen excitedly waving, each creating more fuss than the last. Nineteen Forts took off, each receiving the same boisterous and affectionate cheer.

I was so intrigued with this remarkable demonstration that I missed the first movement of the formation routine, but my guides pointed skyward to show me how, as if by magic, the Forts had joined together in a flight. I am not sure that I ever did understand how it was done, but a lot depended on those Very light signals fired from the leading aircraft, and the fact that the flock maneuvered for position while on course.

Waiting for the B-17s

By David West

The raid was expected to take about four hours—there and back—and I was invited to stay for lunch so that I could see the return. I accepted, knowing my visit would not be complete until I saw the Forts come home. I am thankful that I stayed, because I saw something I shall never forget.

An hour or so before the first bomber was expected, I went to the control tower. Before long, we began to get news from the Royal Observer Corps that some of the Forts were crossing the south coast homeward bound. That information came from the operations room, but it evidently reached others too, for in a few minutes I saw jeeps arriving and unloading airmen onto the grass verge of the runway. The ground crews were making their way to the edge of the runway, each to await the arrival of its own aircraft.

Soon the first B-17 was in the circuit and lining up with the runway for the landing. At first, only those of us in the control tower knew which one it was. As it trundled along the runway and approached the anxiously waiting ground crews, hands shot into the air in greeting. Suddenly and noisily one crew recognized its own aircraft. Some, in their excitement, seemed to be about to chase their plane down the runway, but they soon veered back to their jeeps in a mad scramble. This episode had hardly finished when another B-17 landed and others joined the circuit.

The incoming Forts did not wait until the runway was clear of other aircraft, but just kept coming in, with sometimes two or three on the runway at the same time. Some of the aircraft had been hit by flak. There were gaping holes in wings, and in the fuselage walls.

One had been hit in the nose, and half the Plexiglas window was gone, while another had a piece missing from its tailfin. I thought that if its landing gear folded up, there might be an awful pileup. Sure enough, the gear did collapse. Sparks and dust flew as the metal screeched along the concrete, while the Fort swung in an arc, coming to rest in the center of the runway. Immediately behind came another bomber, rolling at speed. I stood petrified, waiting for the bang. Miraculously, the oncoming craft veered to one side, just missing its disabled companion.

After fifteen of the nineteen Forts in the mission had landed, there was a lull. No more were visible in the sky. Time passed, and the remaining four ground crews and crash tender people kept vigil.

Suddenly, excitement and speculation began again. Number sixteen was in the circuit. This news brought hope to the faces of the airmen, then joy to one group, when the aircraft was identified as theirs. With number sixteen safely home, three were left overdue, with no word of their whereabouts. The three crews waited on, very quiet and anxious, wondering if their buddies had "bought it," or were struggling home, or had made a forced landing somewhere.

Then more excitement. News had come to the control tower that one of the stragglers had landed on a southern airfield, and another was limping home on three engines.

Soon the cripple came into the circuit, and made a cautious and safe landing. Now there remained only one waiting jeep and crew. No news for them. The day wore on, and they waited quietly. I watched as their food was brought to them. Hours passed; I had to leave. I thanked my friends for their hospitality.

On the way back to Steeple Morden I realized that I was still a bit hazy about that formation maneuver. But I had seen more—the enthusiasm of the ground crews when their aircraft took off and their jubilation when they arrived home safely; the devotion of those who waited for late arrivals. I thought of the brotherhood between our two countries, and the spiritual comfort in England's knowledge that we had not been left to "go it alone."

Back at my base, just before going off duty that night, I phoned the Bassingbourne control tower to inquire if there had been any news of number nineteen.

"No, absolutely nothing," was the answer.

"And the ground crew?" I asked.

"They're still waiting by the runway," was the reply.—END

ABOUT THE AUTHOR

Author West, a native of the United Kingdom, learned to fly in the old Royal Flying Corps during World War I, serving until 1920. Recalled to the RAF during World War II, he became Senior Flying Control Officer in the RAF Bomber Command, assigned to three airfields. After the war, he was news editor for Aeronautics, *British aviation magazine, for ten years prior to moving to the United States, where is now* Aeronautics' *overseas editor.*

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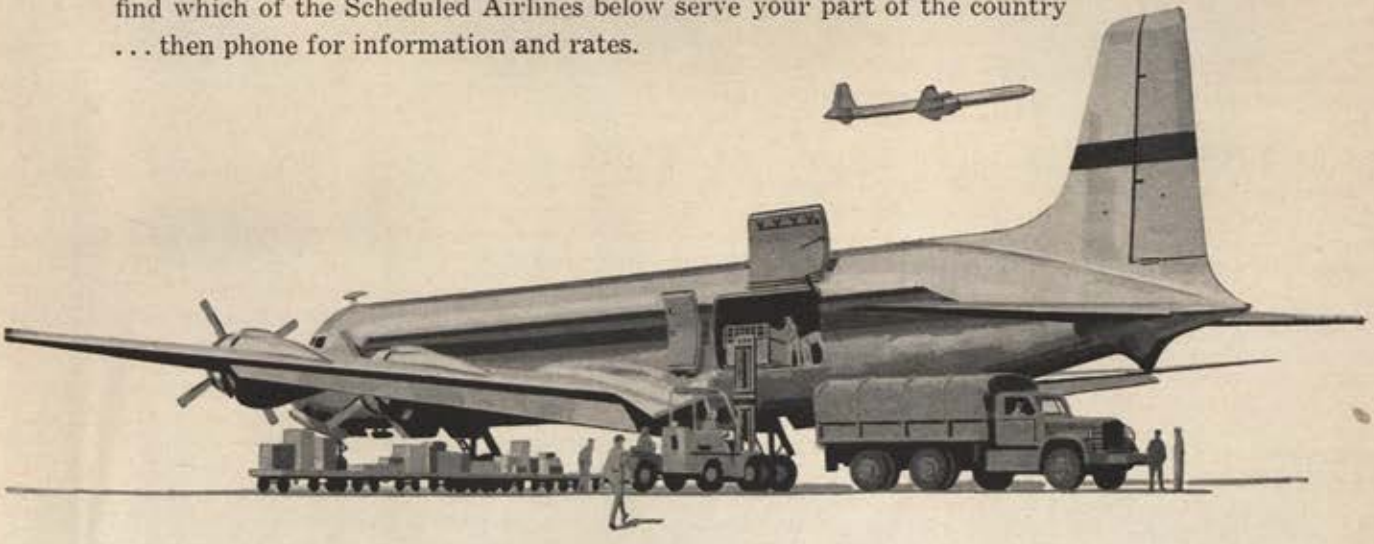

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AFA NEWS

SQUADRON OF THE MONTH

Colorado Springs Squadron, Colo., Cited for

effectively and graphically demonstrating to the community the development of the Air Force, and for emphasizing the role of the Air Force in the peace and security of the nation.

The week of July 30-August 3 was **"AFA Week" in Colorado Springs,** Colo., as the Colorado Springs Squadron sponsored **"Airpower Cavalcade,"** biggest aviation event held there since the announcement that the Air Force Academy would be built nearby.

Don Olson, AFA Squadron Commander, spark-plugged the highly successful program which opened with television and radio interviews designed to excite public interest. The following day indoor and outdoor exhibit programs opened, with some exhibits taking up large spaces in the streets of the city. Twice daily, on July 31 and August 1, enthusiastic audiences packed the **City Auditorium** to hear the **USAF Airmen of Note** and the **"Four Saints,"** followed by a briefing on the mission and activity of the **North American Air Defense Command (NORAD),** headquartered at Ent AFB.

The **Chamber of Commerce** held its annual "Stockholder's Meeting" on July 31 with AFA as joint sponsor. The speaker was **Lt. Gen. Dean C. Strother,** USAF Deputy Chief of Staff for Operations. More than 800 persons attended the luncheon.

During the next three days featured events included an exhibition by the **Thunderbirds,** USAF jet aerobatic team, concerts by the bands from the **Air Force Academy and Lowry AFB,** and performances by the renowned **Air Force Drill Team.** On hand were sixty news media correspondents from across the country, who toured the Academy site.

An estimated **75,000 people** saw or heard some part of this outstanding program, easily one of the most successful AFA-sponsored events in the past year. Chairman Olson himself has said the Airpower Cavalcade would have been impossible to stage without the **invaluable assistance of a great many loyal AFA members, Air Force personnel, and members of the Colorado Springs Airpower Council.**

The **Annual ROTC Awards Dinner**—cosponsored by the **Vandenberg AFA Squadron,** the Detroit chapters of the **Navy League** and the **Association of the US Army,** the **Aero Club of Michigan,** and the **Michigan Aviation Foundation**—took over the Grand Ballroom of the Statler Hotel in Detroit on May 12. More than 100 outstanding cadets from eight area colleges were honored for their military records while pursuing ROTC work.

The **University of Michigan, Michigan State University, Wayne University, Central Michigan, Western Michigan, Eastern Michigan, the University of Detroit, and Michigan College of Mining & Technology** all presented students who received recognition for their accomplishments in Air Force, Army, or Navy ROTC.

Nearly 400 persons, who heard the

(Continued on following page)

Colorado Springs' Mayor Fred Simpson signs proclamation designating July 31 as "Airpower Day," during Airpower Cavalcade. Looking on, from left, are Chamber of Commerce President Stan Hoddy; Lt. Gen. Joseph H. Atkinson, ADC Commander; and Don Olson, AFA Squadron Commander who ran the five-day program.

Dr. Frank E. Sorenson presents Space Education Foundation summer scholarships from AFA's Nebraska Wing to Nebraska elementary teachers. Dr. Sorenson is the Director of University of Nebraska's summer sessions in Air Age Education.

Maj. Gen. Clarence A. Shoop, California ANG Chief of Staff, receives California AFA Wing award from AFA President Peter J. Schenk. Looking on, left, Dr. Hugh Dryden of NACA, and at right, Past National AFA President Arthur F. Kelly.

principal address by **Lt. Gen. William H. Arnold,** Fifth Army Commander, witnessed the presentations. The official welcome was delivered by **Delmar S. Harder,** vice president, Ford Motor Co. Greeting and introductions were handled by **Leslie G. Taylor,** general manager of the Aviation Division of Kelsey-Hayes Co. Awards were presented by **Clarence J. Reese,** president of Continental Motors Corp. **Thomas F. Morrow,** Chrysler Corp. vice president, introduced the guest speaker, while **Russell E. Lloyd,** Vandenberg Squadron Commander, made the closing speech.

New York's Governor, Averill Harriman, right, in Syracuse for N. Y. Wing Convention, discusses air traffic control program with AFA N. Y. Wing Commander, Alden A. West, Program Chairman. West is a nominee for the next AFA Board.

Maj. Howard Johnson, center, is congratulated by Capt. Walter Irwin and Capt. James Low, after setting new altitude record of 91,249 feet in a Lockheed F-104. Low spoke at the June meeting of the San Francisco Squadron.

During California Wing meeting, Leroy Prinz, a World War I aviator and now a well-known Hollywood choreographer, accepts "Airpower Support" award from Harvey McKay, right, who is retiring as Commander of AFA's California Wing.

It's been rather forcefully pointed out to this column that the **San Francisco Squadron's** programs have been less publicized than their effectiveness merits. Here is an up-to-date report.

On June 8, the fashionable Bohemian Club, one of San Francisco's best known spots, was the scene of an afternoon tea dance, hosted by **Lawrence C. Ames,** San Francisco Squadron Commander, and **Mrs. Ames,** in honor of the **sophomore class of the Air Force Academy.** About 275 cadets were on hand, along with a like number of young ladies who had been invited by the Squadron as dancing partners. Officers and councilmen of the Squadron served as chaperones, a sad commentary on the advancing years of AFA members.

John Brooke, Squadron Secretary, was in charge of arrangements. Cohosts were **Convair, Hughes Aircraft, Standard Oil of California, and Continental Airlines.**

On June 24, the regular monthly luncheon of the San Francisco Squadron featured an address by **Capt. James F. Low,** Korean jet ace, and currently Assistant Director of Fighter Tactics (F-104) for the 83d Fighter Squadron, Hamilton AFB, Calif. As a member of the first Air Force unit to be equipped with the Lockheed fighter, Low is helping write the textbook on this plane, aptly dubbed "the missile with a man in it."

This month will mark the beginning of the fourth year of these luncheons which the Squadron features as its **"Airpower in Action"** program. The series started right after the 1955 AFA National Convention, and in many ways has been the most successful program series that any AFA unit has ever staged. Congratulations to the San Francisco Squadron and its hard-working membership.

As this issue of "AFA News" goes to press, the newest addition to AFA's Headquarters Staff, **Louis Ciccoli,** has been with us for just over six weeks. Already his efforts in the field are paying off. His most successful work has been **in Virginia,** where he has spark-plugged the chartering of three new Squadrons and where a Wing is now being formed.

The new Squadrons are in **Richmond, Lynchburg, and Danville,** and all three have now received their Charters. The meeting to elect officers of the **Virginia Wing** and approve a constitution was to be held in Richmond on August 16. With the addition of the already-established Norfolk Squadron, and another in Roanoke, which is presently being activated, the Virginia Wing will be much in evidence in Dallas. This is welcome new activity from a state that has been dormant much too long.

Ciccoli, or "Chick" as he's called, has also been active in other areas. His efforts in **Connecticut** are about to pay off with the formation of Squadrons in **New Canaan and Stamford, Conn.** Recent trips to the Carolinas will soon result in units being formed in **Raleigh-Durham and Greensboro, N. C., and Charleston, S. C.**

After the Convention, when AFA units begin their fall series of programs, Chick will be even more in evidence, for he hopes to cover a great many functions. He will also be on hand in Dallas, along with the rest of the Headquarters Staff.

Word from **Illinois** is that the

(Continued on page 91)

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(To get your current rate of flight pay, multiply your present monthly flight pay by twelve.)

Protection against loss of flight pay due to grounding as a result of accident goes into effect on the last day of the month in which you apply for protection and pay your first premium.

Protection against loss of flight pay for grounding due to disease goes into effect thirty days after the last day of the month in which you apply for protection and pay your first premium.

There's a waiting period before payments start—ninety days for groundings due to disease or nonaviation accidents, 180 days for groundings due to aviation accidents—because unless your grounding exceeds these limits you can collect back flight pay from the government by putting in the required flight time.

But if your grounding exceeds these limits, the AFA plan not only thereafter provides regular indemnities for 80% of lost flight pay, *but indemnifies you for 80% of lost flight pay retroactively,* covering the ninety- or 180-day waiting period in the first payment, at the rate reported on your insurance certificate. For example, one colonel, *grounded, got $1,225 indemnity for lost flight pay in his first check.*

Of course, this coverage does not apply in case of war, declared or undeclared, or hostile action, civil war, invasion, or the resulting civil commotion or riots. There are also other exclusions, which may never apply to you, but you are entitled to know them. These exclusions are as follows:

The plan does not cover persons whose primary duty is parachute jumping.

The plan does not cover losses due to a criminal act of the AFA member, or resulting from bodily injury occurring while in a state of insanity (temporary or otherwise); or from mental or nervous disorders; or from officially certified "fear of flight"; or caused by intentional self-injury, attempted suicide, criminal assault committed by the member, or fighting, except in self-defense; or from failure to meet flying proficiency standards unless caused by or aggravated by or attributed to disease or accident; or accidents caused while riding or driving in any kind of race; or by alcohol, drugs, venereal disease, arrest or confinement; or by willful violation of flying regulations resulting in suspension from flying as a punitive measure; or sentence to dismissal from the service by a general court-martial; submitted resignation for the good of the service; or suspension from flying for administrative reasons not due to accident or disease; or voluntary suspension.

The plan does not cover losses to any member resulting from a disease or disability pre-existing the effective date of coverage, or a recurrence of such disease or disability, whether or not a waiver has been authorized by appropriate medical authority in accordance with regulations or directives of the service concerned. Loss of life shall not be deemed as a loss for purposes of this plan.

In the event that you receive the total limit of twenty-four (24) months' indemnity for loss of flight pay due to aviation accident, or twelve (12) months' indemnity for loss of flight pay due to accident other than aviation accident or to disease, your coverage is automatically terminated. You may thereafter reapply for insurance coverage in the same manner as a new member. Coverage and the payment of indemnities end with the termination of membership in the AFA, or with resignation, retirement, or pensioning from the service, or at age sixty.

The insurance is renewable at the option of the Aetna Insurance Company.

• • •

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(Please Print) Rank Name

Serial Number Years Service for Pay Purposes

Mailing Address

Amount of Annual Flight Pay

I certify I am currently on flying status and entitled to receive incentive pay, and that to the best of my knowledge I am in good health, and that no action is pending to remove me from flying status for failure to meet physical standards. I authorize AFA, or AFA representatives, to examine all medical records pertinent to any claim I may submit.

Signature of Applicant Date

☐ I want to join AFA, $6 dues enclosed.

Application must be accompanied by check or money order for annual premium. The annual premium charge is two percent of ANNUAL flight pay.

Skokie Valley Squadron's most successful program of the year has been concluded—a **model airplane contest** for youngsters under fourteen, which attracted thirty entrants. **Don Nelson,** Squadron Commander, reports that the awards program was attended by these boys and girls, and sixty adults, who heard **Capt. William Stooky,** United Air Lines pilot, speak on the need for stressing interest in aviation.

Trophies, photographs, models, and model kits were distributed to the winners. According to Nelson, the most impressive features of the evening was the fact that so many of the "**experts**" were at a loss for answers to some of the kids' questions.

Cross Country. . . . Word just in from **Jim Snapp, California Wing Commander,** advises us that the **Capital City** and **Sacramento Squadrons,** both in Sacramento, **have merged,** effective immediately. . . . Recognizing the serious lack of information regarding the current air traffic control problem, the **Capital City Squadron** in August sponsored a community program planned to get all the facts on the table. **Bill Gilson,** Squadron Commander, was in charge. . . . **Will O. Ross,** who has been acting as State Organization Chairman in **Alabama,** was recently elected Wing Commander at a meeting in Mobile. The Alabama Wing includes Squadrons in Mobile and Montgomery. . . . Still another state will go to the Convention with a state organization. The three Squadrons in **Iowa** recently elected **Howard C. Reppert, Jr.,** Wing Commander. Other officers include **Dr. Byron Merkel, James R. Mettler, Marvin E. Wills, and James D. McKeon.**

—Gus Duda

Lee Cordell, left, Illinois Wing Commander, and George Anderl, right, AFA Director, with 1958 Wing Award winners. They are, from left, T/Sgt. Victor Dedera, Col. James Mitchell, Col. Theodore Holliday, Col. Robert M. Fry, and Francis B. Porzell. The program was held in Chicago last May.

Make Your Reservations Now for AFA's 1958 Convention in Dallas

Three of AFA's major Convention hotels, Statler Hilton, Adolphus, and Baker, are "sold out," except for a limited number of one-room parlors at the Baker Hotel. Nice air-conditioned rooms are available at the other hotels listed to the right, as well as the Melrose Hotel, which is a short cab ride from the other hotels.

More than 1,500 rooms and suites have been reserved, and reservations are still pouring in. In order that you won't be disappointed, we suggest that you send your reservation request without delay. It is already evident that AFA will use all of Dallas' first-class hotel rooms.

Major Convention events will be held in the new Auditorium; AFA business sessions at the Adolphus Hotel; Reserve Forces Seminar at the Baker.

The Dallas Hotel Association operates AFA's Housing Office. All requests for rooms *must* be sent to the following address:

AFA Housing Office

1101 Commerce Street
Dallas 2, Texas

HOTELS	SINGLE ROOMS	DOUBLE ROOMS	TWIN ROOMS	SUITES
ADOLPHUS	SOLD OUT	SOLD OUT	SOLD OUT	SOLD OUT
BAKER	SOLD OUT	$7.00—12.00	SOLD OUT	ONE-ROOM PARLOR SUITES
DALLAS	$5.00— 7.00	8.00—10.00	$8.00—12.50	$16.00—24.00
SOUTHLAND	4.50— 7.50	5.50— 8.50	6.50—10.50	16.50—17.50
STATLER HILTON	SOLD OUT	SOLD OUT	SOLD OUT	SOLD OUT
TRAVIS	5.00— 7.00	8.00— 9.00	8.00— 9.00	15.00
WHITE-PLAZA	4.50— 8.50	6.00—10.00	6.00—12.00	15.00—27.00

HOTEL ROOM RESERVATION FORM
AIR FORCE ASSOCIATION CONVENTION

DATE_____

NAME_____

ADDRESS_____

CITY & STATE_____

HOTEL_____ (First Choice) _____ (Second Choice)

_____ (Type Room) ( ) Low ( ) Average ( ) High (Desired Rate)

OTHERS IN ROOM_____

ARRIVAL DATE & HOUR_____

DEPARTURE DATE_____

airman's bookshelf

An Ingredient Called Courage

***The Look of Eagles*, by John T. Godfrey (Random House, $3.95), with a Foreword by Gen. Thomas D. White, Chief of Staff, USAF.**

Reviewed by Col. John C. Meyer, USAF

The movies should grab this story. It has everything, even the farmer's daughter.

The late, flamboyant Godfrey, former Air Force major and one of the top aces of World War II in Europe, epitomizes the public's idea of a fighter pilot. His autobiography is written skillfully in rich, warm terms.

Godfrey begins with a description of the illness that was rapidly consuming him and speaks of his glimmering hopes

John T. Godfrey, shown as a 22-year-old first lieutenant, shortly after he transferred to the 8th AF from the RCAF.

of conquering the amyotropic lateral sclerosis, the malady that killed Lou Gehrig. It is a poignant beginning for a book about courage.

Utilizing flashbacks, Godfrey recalls his training in the Royal Canadian Air Force and describes his days of air combat in Europe. The narrative, spiced throughout with his frequent escapades, amuses and charms, yet conveys the moral questions of war.

Underneath it all, the reader perceives the determined will of the aggressive warrior. Determination to be one of the hunters rather than the hunted becomes Godfrey's dominant trait as he transfers to the American Air Force and joins the famous Fourth Fighter Group in combat.

He is something of a maverick in the air as well as on the ground. Unit discipline restricts his drive for personal victory in aerial combat. His lone-wolf attitude provokes his superiors. He becomes a team fighter, however, only when in the company of another outstanding ace—Don Gentile—he discovers that teamwork can actually add to his score. From then on Godfrey's rapid accumulation of kills makes headlines back home, and the Gentile-Godfrey team becomes world famous.

Each battle is a lively, exciting, awesome thing, providing a rare insight into the nature of the fighter pilot.

During a short publicity tour in the US Godfrey balks at the red-carpet circuit set up for him by public relations; he rebels at the discipline of stateside training. His plea to return to combat in England is granted, and he is again off to the wars, running his score to thirty-six kills (eighteen air-to-air victories and eighteen on the ground), before his luck runs out. He is inadvertently shot down by his own wingman and captured by the Germans.

As a prisoner, Godfrey's life is bearable, but he works hard at escape. He finally succeeds, helped by a kindly German farmer whose pretty seventeen-year-old daughter cannot resist the Godfrey lure. Godfrey is recaptured, but escapes once more. This time, in the confusion of the Germans, as the war nears its end, he gets all the way home.

At war's end, he marries happily and settles down in New England. Gnawing at a happy, peaceful life is his growing illness, finally identified as sclerosis. The writer and the reader have come full circle.

The great ace died on June 12, 1958, after a two-year fight against his disease. He dictated the last chapters from a bed of complete paralysis. In the final months it was difficult for him even to move his lips; yet to the end his indominatable fighting spirit prevailed.

About the reviewer. *Colonel Meyer was an Eighth Air Force fighter squadron commander in World War II. He was that Air Force's leading ace, with 37½ aircraft destroyed on the ground and in the air. As commander of the Fourth Fighter Group in Korea, he led the first F-86s against the MIGs, developing the tactics that later proved so successful there. Colonel Meyer is now on the faculty of the Air War College, Air University, Maxwell AFB, Ala.*

"Vee Go"

***Come North With Me*, by Col. Bernt Balchen, USAF (Ret.), (Dutton, $5).**

Reviewed by Dr. William S. Carlson

Credit for much of America's understanding of the significance of polar areas is due air pioneers, notably Bernt Balchen, their dean.

The autobiography of this fabulous Viking, the first man to pilot a plane over both poles, unfolds the story of polar air exploration and adds some sobering thoughts about the role of the Arctic in the future.

It is an intriguing account of an aviator, explorer, adventurer, and war hero who has spent most of his life solving the knotty problems of Arctic flying and Arctic air strategy. With forcefulness, humor, and warmth Balchen tells of his career from his work with the renowned Norwegian Roald Amundsen, to his more recent contributions as an architect of our northern military defense bases and finally his retirement from the USAF.

Included are his experiences flying Adm. Richard Byrd over the South Pole, brush flying in the Canadian wilderness, rescue of the downed *Bremen* flyers, piloting Byrd's *America* across the Atlantic, and pioneering in Antarctica. He writes vividly of the World War II Arctic air-rescue operations he conducted, of his role as head of the US air support to the Norwegian resistance movement, of delicate relations with the Russians, and of his duty in Alaska after the war. Particularly revealing are his candid observations of the many civilian and military leaders in aviation with whom he worked—Floyd Bennett, "Hap" Arnold, "Tooey" Spaatz, Jimmy Doolittle, Richard Byrd, and a host of others.

"Vee go!" in Norwegian-accented English was the only response Bernt Balchen knew when help was needed or a mission laid on—no matter the enormity of the task. And when Bernt Balchen said, "Vee go!", his eyes twinkled and they sparkled.

About the reviewer. *Dr. Carlson, an Air Force Reserve colonel, was an aerologist on one pre-World War II Greenland expedition, led another. During World War II he served as Arctic Consultant to the Air Force in Plans Division, Hq. AAF; and he organized and commanded the Arctic, Desert, Tropic Information Center. He is a past member of the Air University's Board of Visitors, and in 1953 participated in the Air Force's Arctic Mint Julep project. He is now President of the University of Toledo.*

Aerospace Books

Here are two books that tell the astronautics story from the Russian side.

The introduction to *Sputnik into Space*, by M. Vassiliev with V. V. Dobronravov (Dial Press, $3.75), asserts that this is the "first book about artificial satellites to come out of the Soviet Union. . . . It may even contain the record of Soviet things to come."

A popular treatment, the book was first published in Moscow to acquaint the Soviet man on the street with the background and meaning of spaceflight. It has been party-line sanitized and offers no great scientific revelations, but is an interesting insight into Soviet space aspirations. The discussions of scientific (political-resistant) matters are illuminating and intelligible. The book talks about the universe, rockets and engines, characteristics of space, Soviet space research with rockets, and the race to the moon and into outer space. It projects a Soviet manned orbiting satellite by 1980. Author Vassiliev is apparently a Soviet journalist; Dobronravov is a member of the Soviet Academy of Science.

A far more detailed survey is found in *Behind the Sputniks*, by F. J. Kreiger (Public Affairs Press, $6). This RAND Research Corporation study consists of a series of over thirty-six articles and items gleaned either from Russian sources or written by Soviet scientific personnel. The book is a good history of the development of astronautics in Russia, and an examination of Russian research and theory on Sputniks, flights to the moon, interplanetary travel and communications, biological aspects of manned spaceflight, atomic aircraft, and intercontinental rocketry. The author's introduction and annotations add to the completeness of this professional study.

* * *

A new edition of Carsbie Adam's *Space Flight* (McGraw-Hill, $5.50) covers astronautics and such subsidiary fields as astrophysics, communications, geophysics, materials, and space medicine. It surveys the past and present research and development leading to spaceflight and speculates on the future.

* * *

Thirty-five essays by thirty scientists of the faculty of the California Institute of Technology make up *Frontiers in Science*, edited by Edward Hutchings (Basic Books, $6). Chapters deal with various phases of scientific research and development in three broad categories: biological sciences, physical sciences, and the relation of science to society.

* * *

Operation Grasshopper, by Dario Politella (Longo, $4.95)—An interesting recount of the Army's light plane operations in the Korean War from aggression to armistice, 1950-1953. Politella, PIO for Army Aviation during Korea, scans the development of the new "Army Air Corps" and points to a need for more "organic aviation" for ground fighting units. Foreword by Gen. Mark W. Clark, USA (Ret.).

Jane's All the World's Aircraft, 1957-1958, edited by Leonard Bridgman (McGraw-Hill, $30)—Forty-eighth edition of this standard international picture encyclopedia of aviation and world aircraft.

From Kite to Kitty Hawk, by Richard Bishop (Crowell, $3)—A story of man's aspirations and attempts to fly from earliest times to the Wrights; for the ten- to fourteen-year-old.

Basic Aeronautical Science and the Principles of Flight, by Robert D. Blacker (American Technical Society, $5.95)—An illustrated text, reference, and source book aimed at the secondary-school level. Chapters cover history and development of aircraft, aviation as a career, aircraft components, flight fundamentals, meteorology, navigation, theory, and air research. Study questions follow each chapter.

Flight, by the editors of *Year* (Year, $10)—The 1958 edition of this comprehensive picture history of aviation from early theories through ballooning to the present. Current edition is in new handy, manageable format.

Aviation Facts and Figures, 1958 edition, edited by Ben S. Lee (American Aviation, $1.50)—This official publication of the Aircraft Industries Association is a compendium of articles and statistics, comprising a report on aviation in America in 1957. Invaluable to editors and researchers.

* * *

Two lines of aviation education textual materials are attracting wide attention in elementary and junior and senior high schools throughout the country.

The National Aviation Education Council (NAEC) a nonprofit organization located at 1025 Connecticut Ave., Washington 6, D. C., distributes publications from cartoon-illustrated booklets for the four- to six-year-olds to monographs for teen-agers on subjects like helicopters, conventional and jet aircraft, and aircraft factories. Air-oriented teaching aids are designed for English, science, and math courses in secondary schools. NAEC's elementary school *Aviation Education Bibliography* lists a host of additional published materials available.

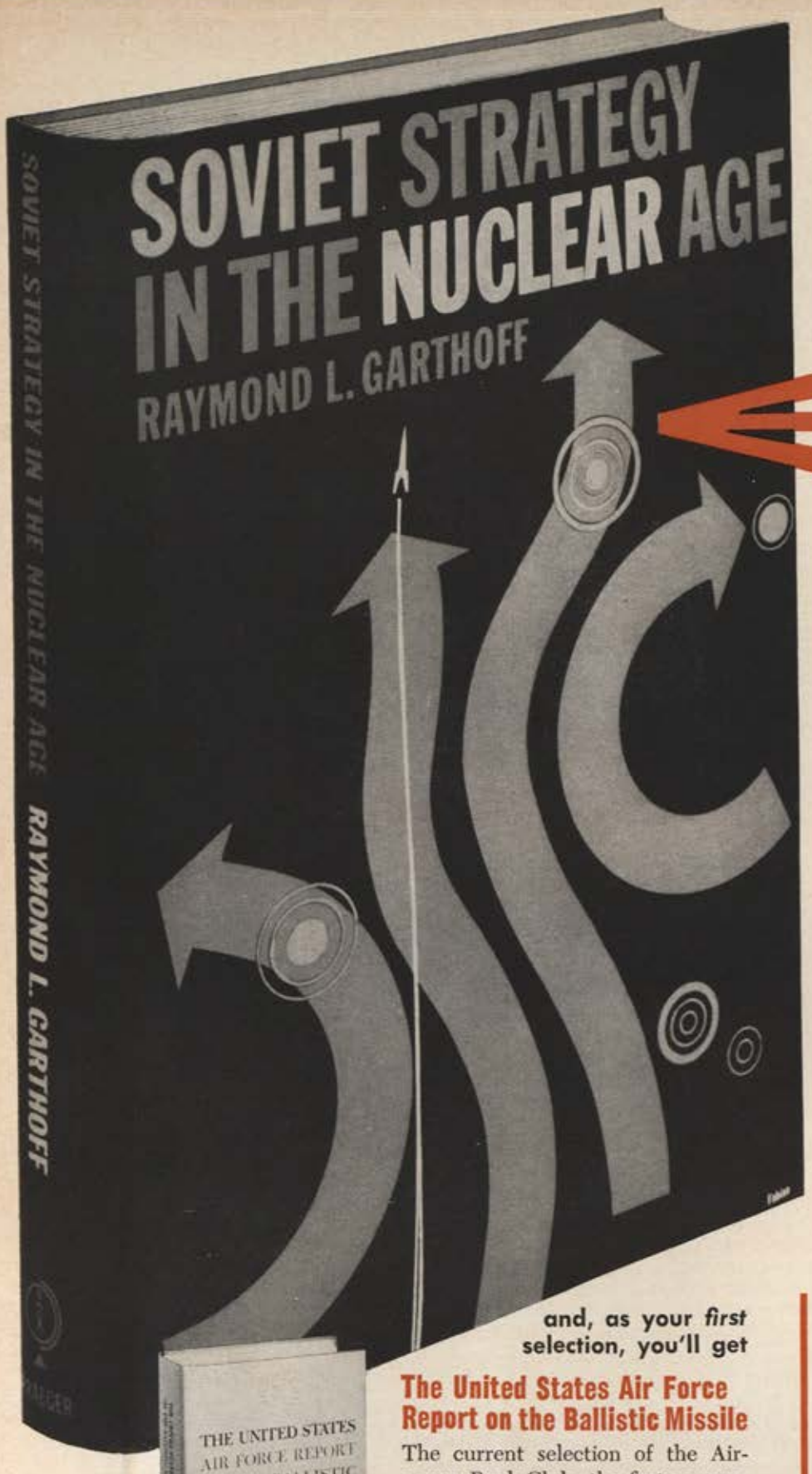
Second grouping of air texts is put out by the Civil Air Patrol with headquarters at Bolling AFB, Washington, D. C. These are tops in their bracket, and written with the teen-ager in mind. Sampling of titles and subjects include: *Aircraft in Flight, Power for Aircraft, Navigation and Weather, Airports, Airways and Electronics, The Problems of Airpower.* Soon to appear is *Toward the Conquest of Space*—an exceptionally fine volume on rockets, missiles, and astronautics. CAP cadets use these materials to qualify for a "Certificate of Proficiency" which entitles them to special consideration upon enlistment in the USAF. Several hundred secondary schools throughout the US also use these texts as a basis for elective courses. Attractive prices are offered: one to nine copies, 60¢ each; ten to ninety-nine copies, 55¢ each; 100 or more, 50¢ each. Accompanying each text is a workbook containing practice exercises and problems and exam questions. Records and film strips are also available from the CAP.

Worthwhile Related Professional Reading

Two of America's well-known, outspoken voices provide thought-provoking commentaries on current issues.

In *Foreign Policy: The Next Phase* (Harper, $3.50) Thomas K. Finletter speaks for redoubled effort to regain US deterrent superiority. He maintains we must discard

(Continued on page 96)



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what he calls the defensive foreign policy of the present Administration and replace it with one that puts the initiative in our hands. Priority must go to missiles and aircraft, he warns, at the same time not losing sight of ground force needs. While the book mainly analyzes the US position in world affairs, *vis à vis* the Soviet Union, the author gives attention to other matters—Asia, Algeria, Israel, Germany, unification of the armed forces, and limited war.

Using known US and Russian facts and figures on military strengths and weapons capabilities, Hanson Baldwin, New York *Times* military analyst, has produced a comparative survey of the current power status of the two. *The Great Arms Race: A Comparison of U. S. and Soviet Power in 1958* (Praeger, $2.95) is an expanded, modified, and enlarged version of six articles Baldwin wrote for the *Times* earlier this year. Baldwin dwells much on US weaknesses and offers a formula for revised defense spending, a new look at force level allocation, and an over-all military reorganization. Maintaining that nuclear air weapons have economic, political, and military limitations, he sees definite roles for larger ground forces with World War II type industrial and military reserve backup. "Man, with a weapon in his hands . . . is still the king of battle," according to Baldwin.

Paperbacks

Great Flying Stories, edited by Frank W. Anderson, Jr. (Dell, 35¢)—An anthology of outstanding aviation stories.

Low Level Mission, by Leon Wolff (Berkley, 35¢)—Dramatic nonfiction minute-by-minute account of the historic low-level mission on Ploesti, August 1, 1943.

Satellites, Rockets and Outer Space, by Willy Ley (Signet Key, 35¢)—A popular, interesting discussion of the conquest of space.

The German Generals Talk, by B. H. Liddell-Hart (Berkley, 50¢)—A look at strategy and tactics and errors of the Wehrmacht and of the strengths of the Allies. Told by defeated German military leaders.

D-Day, by John Gunther (Avon, 35¢)—A vivid account.

Arms and Men, by Walter Millis (Mentor, 50¢)—A study of American military history and military policy from colonial times to 1956.

On the Beach, by Nevil Shute (New American Library, 50¢)—A dramatic suspense-packed novel about nuclear World War III and the destruction of civilization by creeping radiation.

Give Us This Day, by Sidney Stewart (Popular Library, 35¢)—A touching, superbly written account of capture, imprisonment, and months of terror as a Japanese prisoner of war.

Brainwashing, by Edward Hunter (Pyramid Books, 35¢)—A study of the nature of Communist brainwashing and how it can best be combated. Case histories from the Korean War document the work.

Men At War, edited by Ernest Hemingway (Berkley, 75¢)—A new edition of Hemingway's selections of the best war stories.

The Unknown Soldier, by Vaino Linna (Ace, 50¢)—A novel set in the Finnish-Russian war, 1939-40. A popular title in Europe.

Panzer Leader, by Heinz Guderian, Chief of the German Army General Staff (Ballantine Books, 50¢)—An expert account of the German side of the war featuring the massive tank battles and German ground strategy.

—MAJ. JAMES F. SUNDERMAN

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• To assist in obtaining and maintaining adequate airpower for national security and world peace. • To keep AFA members and the public abreast of developments in the field of aviation. • To preserve and foster the spirit of fellowship among former and present personnel of the United States Air Force.

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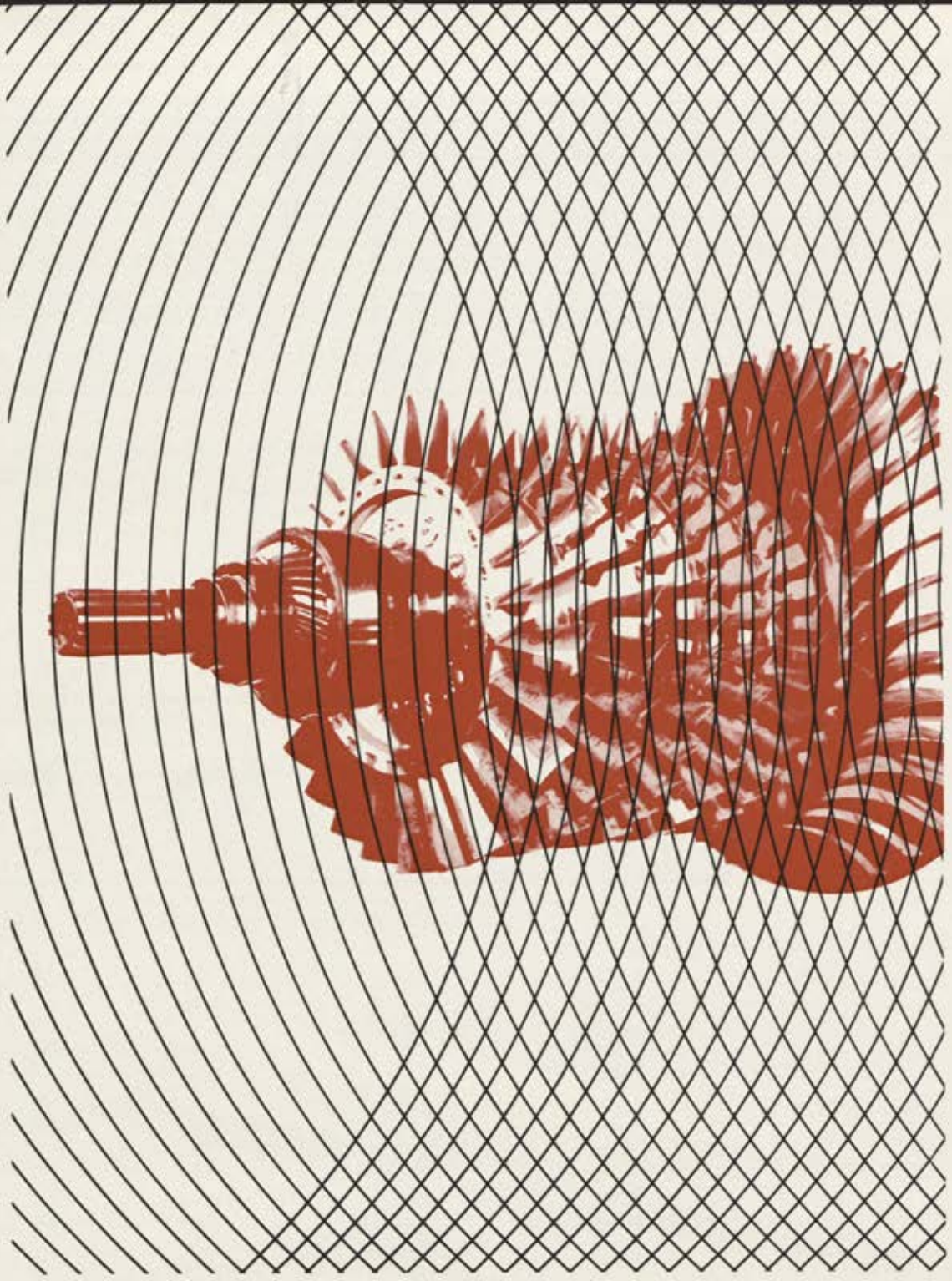

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